A Professional Press Publication

HP Professional

AN INDEPENDENT PUBLICATION FOR USERS OF HP COMPUTERS ■ VOL. 2 ■ NO. 9 ■ $4.00

SEPTEMBER 1988

- Origins Of CIM At RTD
- Joysticks And CIM
- CIM And AI For Flexible Manufacturing

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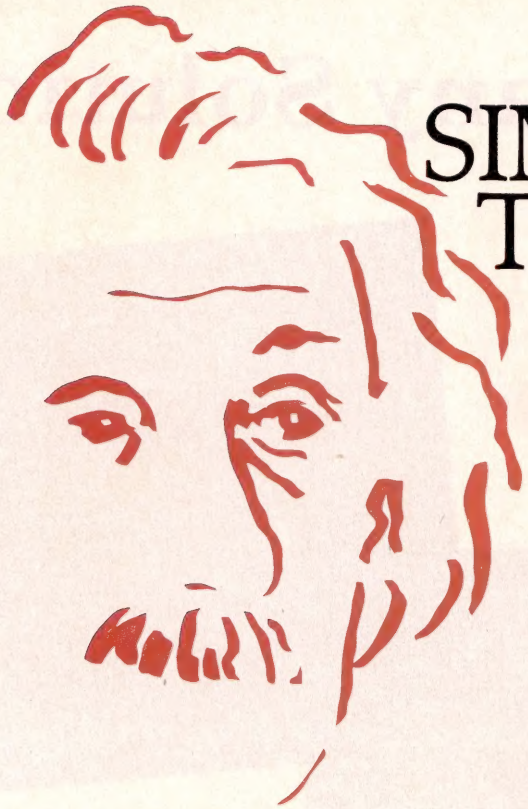

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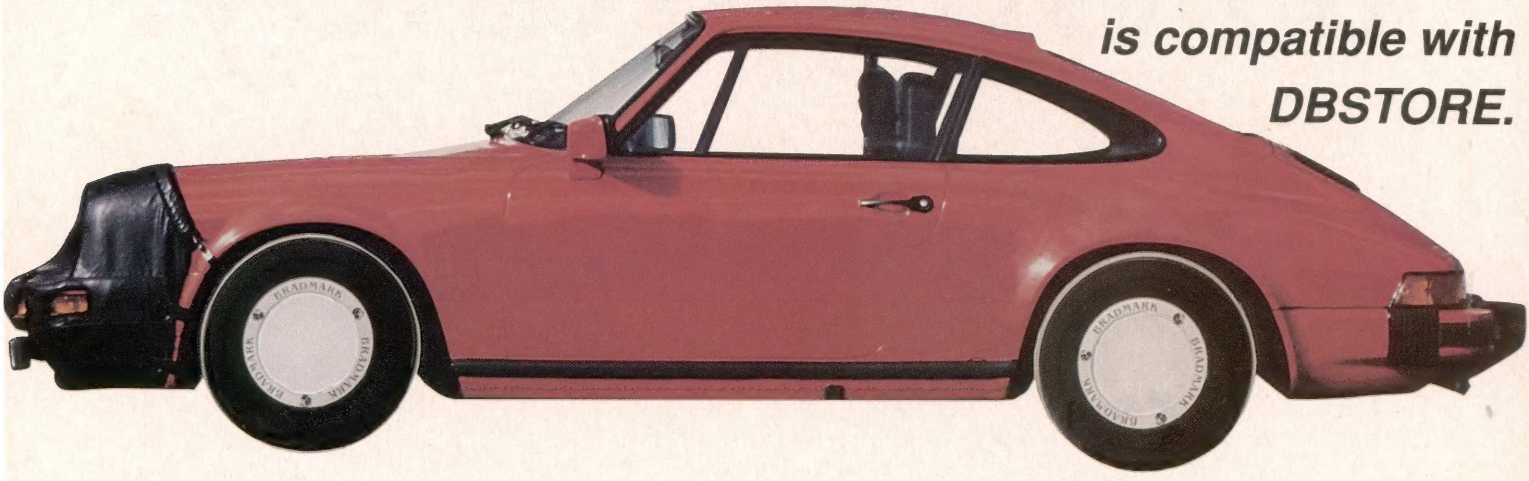

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INTEREX

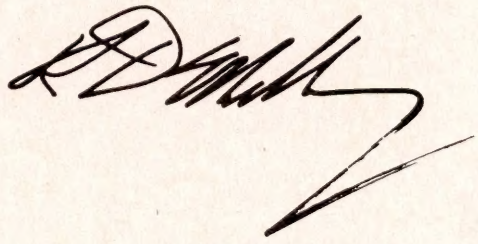
Orlando in August! An amazing place . . . judging from the polyglot hoards in the hotels.

And what a show it was. As a newcomer to the HP space, I always am amazed at the gigantic vendor-sponsored bashes that fill every evening. The attendance was the largest of any HP show we have attended to date . . . at least on the commercial side. There were lots of signs of growth. I especially was glad to see the first of the 8mm helical scan tapes from Exabyte packaged by a few vendors onto the HP-IB.

I spent a major part of my time at the show shopping for a small 3000 for the lab. I found that 37s are both available and very inexpensive. 42s are even cheaper and more powerful, but our computer room could never take the extra Btus and the much larger footprint. By the time you read this, we should have a 37 in-house.

The big letdown at the show was the size and attendance at the technical symposium. Given the ratio of 3000 to 9000 users within our readership, there should have been nearly ten times the 200-odd technical attendees. Having the technical session and exhibition miles away in another hotel certainly did not reflect the new image of HP as "one company." Is it that Interex does not reach the 9000 community, or that the 9000 community, feeling like the unwanted relative, has left Interex behind?

I strongly believe in the "one company" theory. Even in the face of the following: I am buying an 825. Because it is a precision architecture machine, why on earth can't I boot both HP-UX and MPE/XL? True, I need a different terminal interface, but why can't I get a machine with BOTH kinds of interface attached? If I could do that, I could afford an 835 because I would not have to buy a 37 to run MPE. Every one of our six VAX machines can boot both VMS and ULTRIX without the slightest complaint. Is this a marketing decision, or an unintended vestige of the "two company" theory? Your comments always are welcome.



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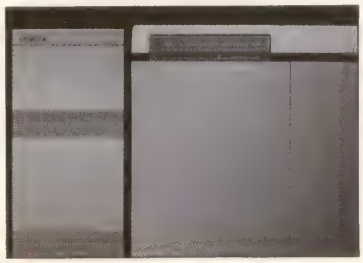

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CIRCLE 136 ON READER CARD

INDUSTRY WATCH

Ann Marie Lasak

CIM: Because Manufacturing Matters

Editor's Note: The following focuses on information that I obtained at Hewlett-Packard's fifth annual "CIMinar." The CIMinar is an editorial seminar held each year to keep the editorial community informed about the latest trends in computer-integrated manufacturing (CIM). This year's CIMinar was held at the Carmel Valley Ranch Resort in Carmel, CA, July 6-9. Editors from all parts of the country, representing a wide range of trade publications, gathered to learn the latest on CIM from the nation's leading authorities on the topic.

By definition, computer-integrated manufacturing is a strategic framework for linking existing technologies and people to manage previously independent activities to achieve a total manufacturing system. Unfortunately, dictionary definitions are far removed from the realities of the factory floor.

Perhaps it is easier to understand what CIM is by first understanding what CIM is not. According to Lew Platt, executive vice president of HP's Technical Systems Sector, "It's not just a bunch of computers, robots or black boxes, although it makes use of them. It is not a one-time event or a revolution. It's not a product. Nobody can put it in a box and ship it to you with instructions on how to hook up your factory in five easy steps."

While each of the speakers at this year's CIMinar had his own CIM story to tell, there were a few recurring observations and common themes surrounding the subject of CIM.

- *CIM is a strategy often involving a complete cultural change affecting every member of a corporation from the CEO to the people working on the line.*
- *CIM applications must focus on the user. We currently are producing technology faster than we are learning how to use it. Buying better, faster machines won't guarantee your success. Without user-friendly human interfaces and adequate training and education, technology is worthless.*
- *CIM applications must have lasting value. There must be a clear migration path established for system upgrades and a commitment to operating and communications standards.*
- *CIM must be a strategic investment program. Those concerned with return on investment must be able to see that CIM makes financial sense.*

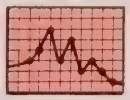
"In the beginning, industry pundits, including manufacturers, predicted the emergence of fully automated factories of the future, designed from the ground up for maximum efficiency and brought online in one huge comprehen-

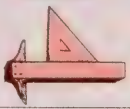
FIGURE 1

Pressures to Implement CIM


WORLD COMPETITION


INCREASING MANUFACTURING COST

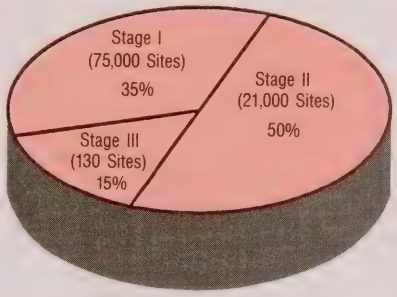

SHORTER PRODUCT LIFE CYCLES


MARKET DEMAND FOR CUSTOMIZATION


INCREASING GOVERNMENT REGULATION

FIGURE 2

CIM Stages of Implementation



Stage I-Getting started with first "islands of automation"
Stage II-Islands in place, next step in integration
Stage III-Experienced in automation, planning on CIM

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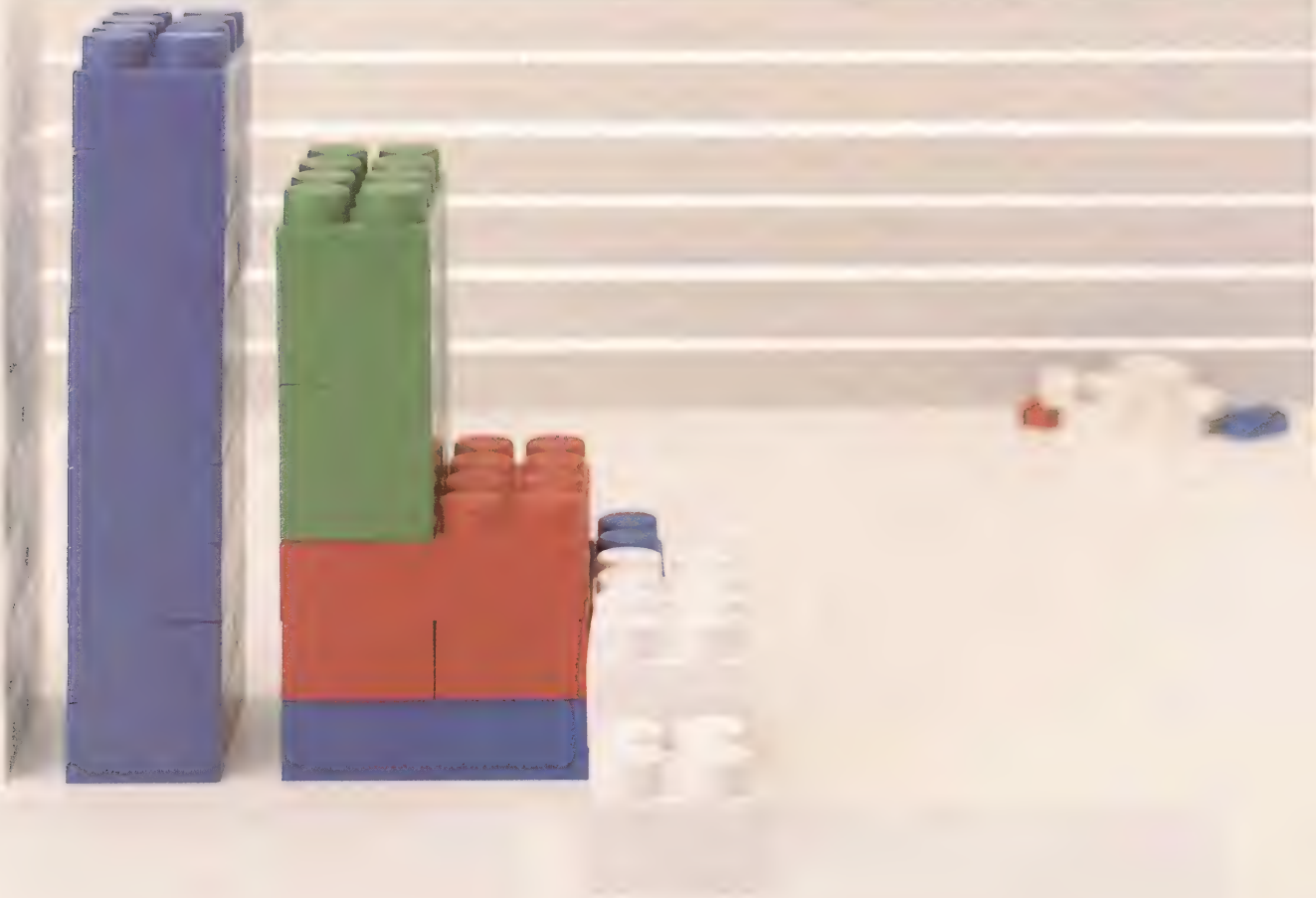

The DataExpressSeries provides end users with access to their data on the HP3000 for downloading to PCs, HP3000 applications or end user reporting.

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CIRCLE 134 ON READER CARD

sive package," said Platt.

"That hasn't happened and, except in rare instances, isn't going to. It isn't going to because, when you think about it, wholesale integration defies good common sense and doesn't make good economic sense either.

"You might ask, then, 'If the pundits are wrong, how are we going to meet the challenges of manufacturing that we all face in today's extremely competitive business environment?'

"There is an answer, and it involves CIM, but CIM implemented in an evolutionary, rather than a revolutionary, manner."

The CIMinar speakers all agreed that you can't implement CIM in a vacuum. CIM has the potential to revive American manufacturing only if corporate cooperation and a firm commitment to computing standards are top priorities.

"No manufacturer can provide all the software answers to your problems. Therefore, companies like HP work closely with third-party vendors to bring the best possible software to market to fill your needs. They have knowledge of specific industry practices computer manufacturers probably don't have, and you need that help," said Platt.

"Right now it isn't easy to implement CIM when you are concerned with making sure all of your devices and computers will be able to talk to each other, sharing data and programs. The standards that will allow computers from different manufacturers to work with each other are evolving. HP is working diligently to help insure that workable standards are developed, and we have promised that as standards are developed or become de facto standards we will adopt them. We, too, have a dream of vendor-independent integrated systems."

What Drives Manufacturers To CIM?

According to George Henry, president of Tatham Process Engineering (Folsom, CA), manufacturers contact his firm for CIM education and training when they have had a "significant emotional event" (e.g., a 50 percent reduction in revenues, Japanese pressure, etc.), or they know that one is coming and react in a proactive fashion.

HP's Roseville Manufacturing Operation's leap into CIM was a reactive as opposed to a proactive response to market pressures.

HP's document, *Preparing for and implementing Computer-Integrated Manufacturing: an electronics industry case history*, openly cites the event that drove HP's Roseville Networks Division to CIM. "One particular occasion set the stage for Roseville's big push. After meeting all day at a large Japanese manufacturing company, the manager was politely told, 'The United States should go back to doing what it does best — agriculture — and leave manufacturing to the Japanese.' This is known as a 'Significant Emotional Event': the pivotal experience that pushes an individual into championing a cause. Some consider it a precondition for successful CIM implementation."

How Many Manufacturers Are Implementing CIM

Brian Moore, HP's general manager of Computer Manufacturing and Planning, has broken CIM into three stages of CIM implementation. Stage 1 includes those sites that are getting started with their first "islands of automation" or are doing nothing. Stage 2 includes those sites that have some islands in place and will take the next step toward adding additional islands and beginning incremental integration. Stage 3 includes those sites that are experienced with automation and are involved in the implementation of a CIM vision.

So where does U.S. manufacturing stand? According to Brian Moore, 75,000 sites, representing 35 percent of U.S. customer spending, are currently at stage 1; 21,000 sites, representing 50 percent of U.S. customer spending are at stage 2; and a paltry 130 sites, represent-

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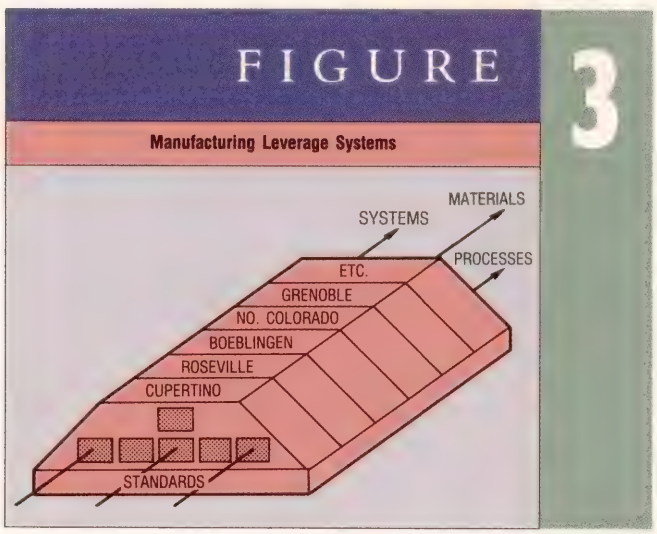

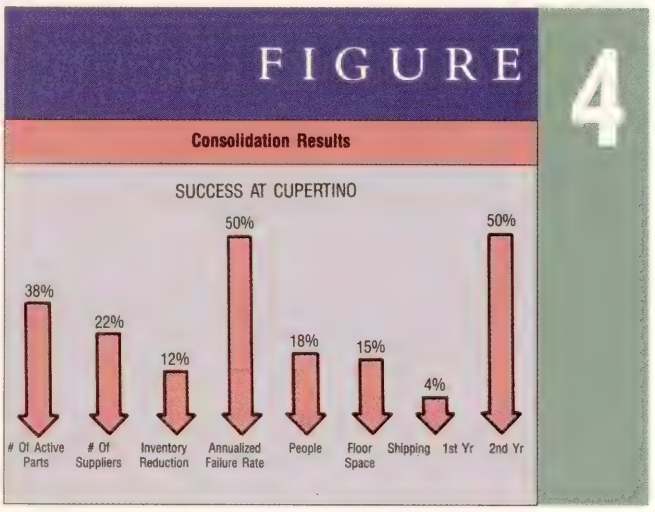

Two ways to solve your system backup problem: BackPack™ ... and BackPack!

BackPack offers two ways to lighten the burden backup places on data center operations. First, you can take the 'traditional' approach, simply substituting BackPack for HP STORE in your job streams. BackPack cuts backup time by 35-50% on most systems, and halves tape usage as well. What's more, by incorporating DBSTORE into daily backup, BackPack eliminates the need to backup each database separately — an additional time and tape savings for IMAGE users.

A second alternative is to institute unattended backup procedures. In BackPack's "operatorless" mode, you start the store, mount a tape, and leave. BackPack fills the first reel, stores remaining data in compressed format to disc, and resets all store bits. In the morning, you copy the data to tape concurrent with normal system usage. For an unattended full dump, you need one-third of your total disc space free. With less space, you can probably still do daily backups unattended and full dumps partly unattended.

With versatile options like these, BackPack solves just about any HP 3000 backup problem. Why not put BackPack to work for you?

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CIRCLE 140 ON READER CARD

Hewlett-Packard Announces HP Real-Time Database

A Standard Tool For Creators Of Non-Generic IA Solutions

Hewlett-Packard recently announced the release of HP Real-Time Database — the first in a series of HP Industrial Precision Tools (HP-IPT). This database-management product provides a generic and flexible set of software routines.

It allows creators of industrial-automation solutions to produce and access high-performance, memory-resident databases on the HP 9000 Series 800 family of HP Precision Architecture computer systems.

Developed by the HP Industrial Application Center (Sunnyvale, CA), HP Real-Time Database provides a high-speed front end to disc-based databases. Customers can expect a 100- to 1,000-fold improvement in performance over current data-management subsystems. HP Real-Time Database also can be used as the only database subsystem in conjunction with other HP-IPT products or with any outside application tool of the user's choice.

HP Real-Time Database helps create high-speed database-management subsystems, a rapidly growing segment in the industry-wide drive to greater software productivity. Virtually every workcell and area-management solution has a customer real-time database.

Because the HP Real-Time Database is a memory-resident data-management system, it eliminates the need to write a custom real-time database. By reducing development time, costs are substantially reduced and programmers can focus their development efforts on the IA application rather than the database.

HP Real-Time Database offers two types of data structures: relational-style tables that store data for maximum programming ease and unformatted input areas for maximum performance and flexibility. Software developers also can rapidly configure and debug programs without writing code by using the provided interactive query facility.

As part of HP's commitment to standards, HP Real-Time Database provides software developers of both standard and custom applications with an HP-supported component that will eliminate the need to write custom real-time databases for each new product or project. HP Real-Time Database offers support for C and FORTRAN operating under the HP-UX operating system.

U.S. list prices for HP Real-Time Database running on HP 9000 Precision Architecture computer systems range from $2,000 to $8,000 for Series 825 and 835, $2,900 to $11,600 for Series 840 and $3,600 to $14,400 for Series 850 and 855. Delivery is estimated at eight weeks ARO.

Vectra Price Tag Cut By Up To 18 Percent

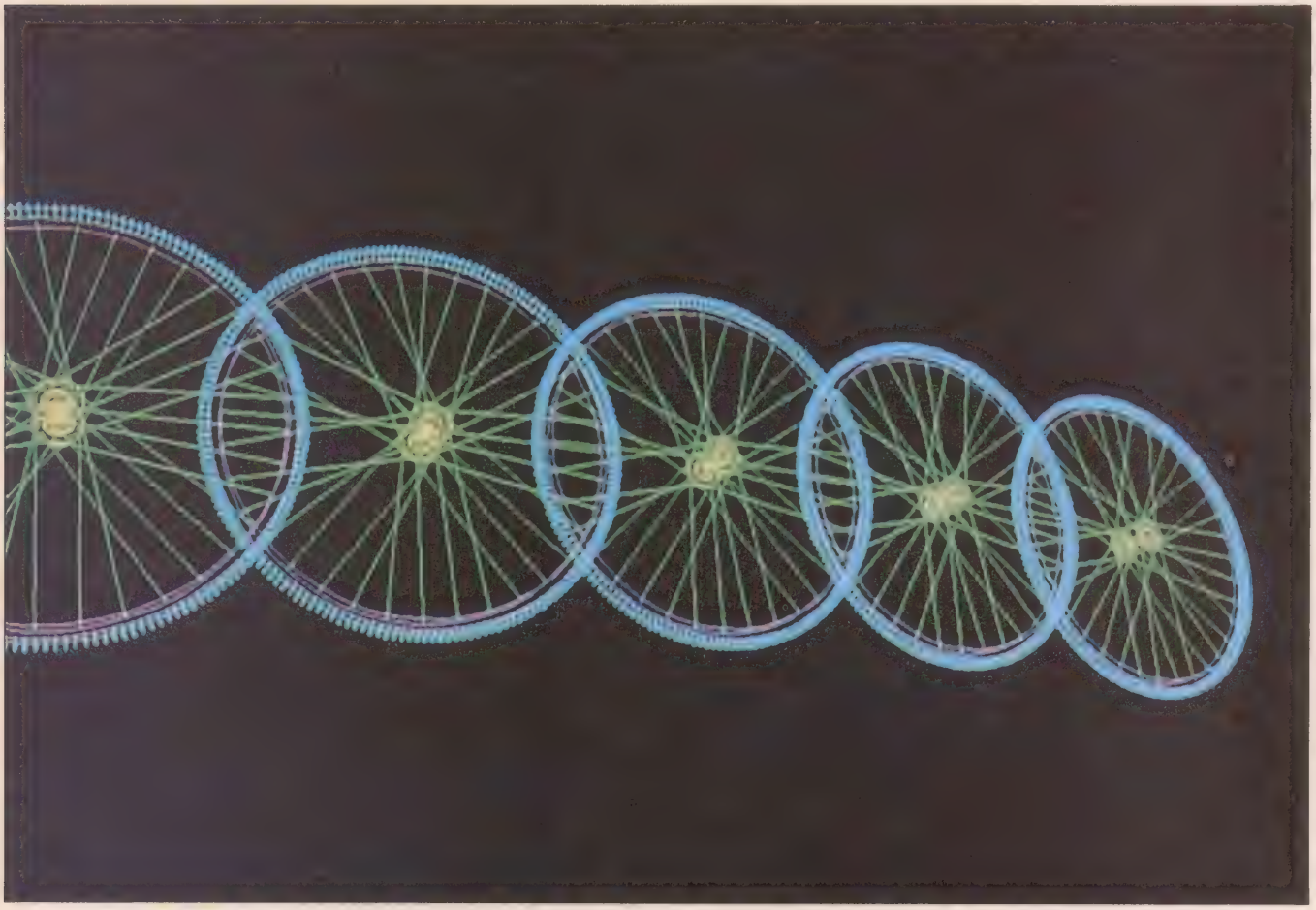
Reductions Reflect Increased Sales And A Competitive Market

Hewlett-Packard reduced its prices by up to 18 percent on HP Vectra ES and HP Vectra RS personal computers. HP said the price reductions reflect increased sales volume and competitive market conditions.

HP also announced that 3.5-inch, 1.44-MB flexible-disc drives and HP video-graphics adaptors now are included in the new versions of its HP Vectra CS, HP Vectra ES and HP Vectra ES/12 PCs.

The HP Vectra RS/20 Model 300 PC — which has a 310-MB hard-disc drive and is based on a 20-MHz Intel 80386 microprocessor — is being reduced from $11,995 to $10,495, U.S. list price.

The HP Vectra ES/12 Model 46 — which has an Intel 80286 microprocessor, a 1.2-MB flexible-disc drive, a 40-MB hard-disc drive and an HP video-graphics adaptor — is being reduced from $4,595 to $3,995, U.S. list price.



FIGARO software is engineered for the graphics and computing environments found in integrated workstations.

TGS And Silicon Graphics Join Forces

FIGARO To Be Marketed With IRIS 4-D Product Line

Template Graphics Software Inc. (San Diego, CA) and Silicon Graphics Inc. (Mountain View, CA) recently announced that they have signed a distribution agreement whereby Silicon Graphics will sell and support TGS' FIGARO software with the IRIS 4-D product line that is based on the MIPS computing unit. FIGARO will be very tightly integrated with the IRIS 4-D product line and will give users maximum performance while implementing the PHIGS standard.

FIGARO, the TGS enhanced implementation of the Programmer's Hierarchical Interactive Graphics System (PHIGS) standard, is the first commercially available high-performance device and computer-independent PHIGS implementation.

FIGARO currently is available on most high-end workstations including platforms from Hewlett-Packard, Sun Microsystems, Apollo, Prime, DEC, Stellar and Tektronix as well as computers manufactured by IBM and DEC.

FIGARO's internal design defines a high-level Graphics Engine Interface (GEI), which allows FIGARO to utilize the high-performance graphics accelerators that support 4 X 4 floating point matrices and can transform and clip 2-D and 3-D lines, polygons and text specified in full floating-point coordinates. The GEI allows TGS to support FIGARO on other platforms.

FIGARO software is engineered for the graphics and computing environments found in integrated workstations. It utilizes virtual-memory facilities for graphics data storage, data manipulation and data traversal for display. It is integrated with resident workstation window managers and utilizes the interactive input capabilities of these engineering workstations.

Silicon Graphics Inc. designs, manufactures, markets and services high-performance superworkstations specifically for the needs of three-dimensional applications that require 10 to 100 times more computational power than two-dimensional applications.

X Window System Version II Introduced By Hewlett-Packard

Available On HP 9000, Series 300 And 800, And Vectra

Hewlett-Packard recently announced the X Window System Version 11 (X11) for the HP 9000 Series 300 and HP Precision Architecture Series 800 technical computers, and the HP Vectra personal-computer family.

In addition, HP announced an improved user interface, X Toolkit, including the X Toolkit Intrinsics and X Widgets, that provides the software tools needed to make the development of X-based applications easier and faster.

The combination of the X Window System and HP's industry-standard network offering will allow HP's MS-DOS and UNIX system workstations to access X-based applications in a multivendor environment. These product introductions include support of an extensive line of display hardware and graphics capabilities, from EGA-equipped PCs to the high-performance graphics workstations.

The X Window system is based on a client/server architecture. In this architecture, clients, or X-based applications, make requests for resources (display, keyboard, mouse or other input devices) from the server. X11 for the Series 300 and 800 provides these workstations with a network-compatible windowing environment based on the newest version of the X Window System, including both X-client and X-server capabilities.

The X Window System/PC (X/PC) for the HP Vectra PC family provides X-server capabilities and brings the power of the X Window System to the HP Vectra ES and RS PCs. X/PC software, configured with one of these HP Vectra PCs, is the low-priced display server within HP's offering of X-based workstations. X/PC allows an HP Vectra PC to use the computing power of other X hosts on the network by providing a graphically oriented "window" to access networked, X-based applications.

HP supports a wide range of graphics platforms with its X11 products. All currently available bit-mapped displays for the Series 300 and Series 800 workstations are supported. X11 can be used with any of the Series 300 CPUs, including the new HP Model 360, a 5-MIPS workstation based on Motorola's MC68030.

Also supported are any of the current graphics cards, from the 512 X 400 medium-resolution board to the 1,280 X 1,024 high-resolution color-graphics cards. All of the Series 800 bit-mapped displays are supported. The X Window System/PC for the HP Vectra PC family supports medium- to high-resolution graphics, including EGA, VGA and HP's 1,024 X 786 intelligent-graphics controller.

HP's X11 is designed for software developers who are creating X-based applications and want access to the newest version of the X Window System, as well as a set of effective X-based programming tools.

Application developers, working with HP X Widgets, can increase their productivity, reduce code-maintenance requirements and produce consistent user interfaces that do not need to be relearned from one application to another. The number of code lines in a typical application can be reduced significantly when created with HP's user-interface tools.

Software developers have the choice of building a user interface for their application based on HP X Widgets, designing their own widgets, or using a combination of the two. With these tools, software developers can use pop-up menus, panels (or forms), scroll bars and a variety of other widgets to construct the desired user interface.

Delivery of the X Window System Version 11 was scheduled for August 1988 for the Series 300 and fourth-quarter 1988 for the HP Vectra PC family and the Series 800. Single copies of the X Window System for the Series 300 are $815, $2,100 for the HP 825/835, $3,200 for the HP 840, $4,500 for the HP 850/855 and $495 for the HP Vectra PC family.

SAS System Available For HP 9000 Series 800

'RISC Makes The Series 800 An Ideal Platform For SAS'

The SAS System, SAS Institute's (Cary, NC) integrated system of software for data management, analysis and presentation now is available for HP's 9000 Series 800 technical computers. Support for HP's Series 300 was available earlier this year.

"HP's Precision Architecture (RISC) makes the Series 800 an ideal platform for the SAS System," said Barrett Joyner, Marketing Manager at SAS Institute. "With the Series 800, users can exploit the full power of SAS System while maximizing performance with a RISC-based architecture."

The SAS System under HP-UX includes logical, modular components for data entry, retrieval and management; report writing and graphics; statistical and mathematical analysis; and applications development. The software supports HP-UX, which adheres to AT&T's UNIX System V Interface Definition 2, and will be distributed on 9-track tape and data cartridge used on HP's 9144 tape drive.

The SAS System is licensed annually, with fees based on machine size. Each module in the SAS System is licensed separately. The first year fee for base analysis and report writing ranges from $500 to $7,500. Renewal rates are lower.

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CIRCLE 210 ON READER CARD

HP64771A/AL emulators/analyzers support all modes of operation for the Intel 80C196-KA microcontroller.

HP Introduces Emulation For Intel 80C196-KA Microcontroller

Offers 80C196 Development Tools

HP has combined its new HP 64700 emulation technology with its logic-analyzer-on-a-chip to create high-performance development tools for the Intel 80C196-KA microcontroller. The new products are members of the HP 64700 series emulators/analyzers.

The new development tools consist of a standalone in-circuit emulator and emulation bus analyzer for the Intel 80C196-KA. Also available is a fully integrated 16-channel analyzer that functions as a 100-MHz state analyzer as well as a 25-MHz timing analyzer.

The tools are host independent and can be operated by most computer mainframes, workstations or basic terminals. Special user interfaces are available for IBM PCs and compatibles, including the HP Vectra PC and HP 9000 Series 300 technical workstations.

For designs involving multiple microprocessors, a coordinated measurement bus allows synchronization and cross triggering of up to 32 HP 64700 Series emulators/analyzers. Once connected, each of the HP 64700 analyzers can be synchronously started, cross-armed, cross-triggered and halted.

For users desiring coordinated emulation and analysis tools in the HP 64000-UX advanced integration environment, the coordinated measurement bus can be linked to the HP 64000-UX intermodal bus. This allows access to all of the other HP 64000-UX tools including the 400-MHz timing analyzer, the 120-channel state/logic analyzer, and more than 40 8-, 16-, and 32-bit emulators.

HP believes it is the first vendor to offer Intel 80C196-KA emulation/analysis support for small design teams with a migration path to a high-performance development environment for the largest development teams.

Model 64771A (emulator and emulator bus analyzer) is priced at $13,200. Model 64771AL (emulator bus analyzer and timing/state analyzer) is priced at $15,800.

EMC Announces Plans To Increase HP 3000 Memory Prices

DRAM Prices Continue To Escalate

EMC Corporation recently announced that it will be raising prices on all of its HP 3000-compatible memory arrays by 18-24 percent.

The increases are the result of increased costs of manufacturing, due to the escalating prices of DRAM chips. "Prices of DRAMs have increased dramatically," said Senior Product Manager Michael Beaudet. "The chip shortage has been impacting the industry for some time. We have seen evidence that even the major manufacturers are feeling its effects."

"EMC's prices should remain 15-20 percent below HP's new prices," said Jack Egan, EMC's executive vice president.

Vectra PC Accessory Card Available

Stores PC Programs In ROM

Hewlett-Packard recently announced a read-only memory (ROM) card for HP Vectra PCs that lets software developers store their applications in ROM or erasable, programmable ROM.

The HP ROM disc accessory eliminates the need for users to load programs from a mechanical disc drive, allowing faster access to applications. HP is marketing the card to OEMs, value-added resellers, software developers and in-house systems experts who install their applications on the card and then make it available to users.

In addition to making any application fast-loading and easy to install, the HP ROM disc accessory can be set up to load the application automatically in ROM whenever the PC is turned on. In this way, the card can be used to customize HP Vectra PCs or airline ticketing, car rental, videotex, protocol controllers and other applications that require single-function workstations.

The HP ROM disc accessory ($235) comes with MS-DOS 3.2 and sockets for up to 786 KB of memory to store applications. Any application using up to 768 KB of memory can be stored on the card. A programming kit ($260) also is available to help developers install applications.

No modifications are required to store programs in ROM, and a "copy-protect" device prevents others from copying software installed on the card.

In addition, HP terminal emulation software now is available on the HP ROM Disc Accessory card ($265). The HP Terminal ROM card makes the HP Terminal Program permanently "resident" in your PC.

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CIRCLE 160 ON READER CARD

SAS Institute, HP Team For National Hardware/Software Offer

Joint Promotion Offers Free 30-Day Trials

SAS Institute Inc. and Hewlett-Packard recently began a joint promotion offering qualified prospects a free 30-day trial of HP hardware and SAS software.

"Our goal is to establish HP-UX system computers and the SAS System as 'the packaged solution' for comprehensive data management, analysis and presentation," said HP's Srini Nageshwar. "The HP computers and SAS software make an ideal team for both engineering and business applications."

The evaluation package offers four hardware configurations: three single-user systems based on the HP 9000 Models 319C+, 350CH or 835CHX, and a multiuser system based on the HP 9000 Model 835S.

The evaluation package also includes the SAS System, a modular, integrated software system for data management, analysis and presentation.

The 30/30 program is being offered only in the U.S. through direct sales channels until September 30, 1988. Estimated delivery of the loaner system is four weeks ARO.

Computer Solutions Provides Disaster Recovery For HP 3000

Answers Market Demand

Computer Solutions Inc. (Orange, NJ) recently announced its entry into the disaster recovery marketplace. Geared specifically for HP 3000 users, CSI's services include both hotsite and portable recovery.

CSI has been a VAR and dealer of remanufactured HP CPUs and peripherals for nearly 20 years.

The corporate headquarters in Orange houses a pool of systems, large and small, as a hotsite resource. The facility includes optional office space and office equipment as well as a team of field service and facilities management personnel who provide the necessary technical support for a smooth disaster recovery operation.

An HP Micro 3000, complete with CRTs, printers and telecommunications equipment, is the portable recovery alternative. The portable system is shipped to a site of the customer's choosing in the case of an actual disaster.

Recovery procedures are expedited as a result of a 24-hour disaster hotline. The hotline assures subscribers that technical personnel are "ready, willing and able" if an actual disaster should occur.

According to CSI, they are able to offer disaster recovery services at a third the cost of its competitors.

HP Works With Fisher Controls And Coopers & Lybrand

CIM Technology Center Offers Live CIM Demonstrations

Process industry companies involved in implementing computer-integrated manufacturing (CIM) now can view a working demonstration of this technology at the CIM Technology Center, a first-of-a-kind facility developed jointly by Fisher Controls, Hewlett-Packard and Coopers & Lybrand.

The Center offers a real-world look at process control technology with supervisory control and plant management, in a fully integrated environment comprised of key hardware and software components that illustrate true computer-integrated manufacturing in operation.

The facility enables process-industry executives to better understand the applications of CIM in their own business operations. The center illustrates that a sound, planned approach can reduce their risk, optimize their return on investment and provide a foundation for understanding successive stages of CIM-based technology.

According to Brian Moore, general manager of HP's Computer Manufacturing & Planning Group: "CIM has too often been viewed as a destination, rather than a series of way stations, on the road to industrial automation. The building blocks of CIM — particularly the control of processes through real-time feedback — are functionally demonstrated in the CIM Technology Center. It shows again that the best strategic approach to CIM is to plan from the top down and implement from the bottom up."

Each of the three firms involved with the CIM Technology Center plays a vital role in this process. Together, they form a strategic alliance that addresses key questions about the benefits and planning requirements of CIM. These include setting CIM objectives; determining where a company currently stands with respect to CIM; selecting and implementing the requisite hardware, software and control equipment; and studying how CIM can increase competitiveness.

"Process industry companies can follow our lead in CIM partnering," C&L's William Mosconi said. "Just as Hewlett-Packard, Fisher Controls and Coopers & Lybrand have formed a strategic alliance in this Center, companies can and should strategically align their business functions for greater operating efficiency through CIM."

Coopers & Lybrand, Fisher Controls and Hewlett-Packard intend to expand their strategic alliance by creating other CIM Technology Centers in the near future. Currently planned are facilities in Austin, Texas, and in Los Angeles. ■

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CIRCLE 200 ON READER CARD

NEW PRODUCTS

PMIS Now Available On HP 9000 Series 800

Bradley Ward Inc. has announced the availability of its Process Monitoring and Information System (PMIS) on HP 9000 Series 800 computer systems using the HP-UX operating system (HP's real-time version of UNIX System V). Previously available only for HP 1000 A-series computer systems, PMIS has been ported and operates identically on both the HP 1000 and the HP 9000/800.

PMIS ($10,000 — $50,000) is a process monitoring and control system that communicates with almost any device within a manufacturing facility (programmable controller, scales, robots, etc.) and quickly provides information to you using graphical or tabular displays, which are user-defined. Statistical charts and graphics also can be generated based on current or historical process information. This information also can be exported to standard databases (Oracle, Informix) or remote computer systems such as IBM hosts.

In addition to porting the PMIS features, many enhancements have been made to the PMIS product line. A new operater interface that "hides" the computer's operating system from operators via hierarchical menu blocks has been added. A tabular display/report editor has been added to permit dynamic and interactive displays and printed reports.
Contact Bradley Ward Inc., 5 Dunwoody Park, Suite 115, Atlanta, GA 30338; (404) 396-4292.

Circle 400 on reader card

SA1/3000 V1.1 Includes Horizontal Scrolling

Version 1.1 of SA1/3000, a full-screen editor designed for programmers who develop software on the HP 3000, is now available. The incorporation of horizontal scrolling permits the editing of ASCII files of any length. Documentation and training manuals have been rewritten completely.

Working with a 22-line window, the user moves the cursor to add, change or delete text anywhere in the file. Vertical scrolling occurs automatically. Horizontal scrolling takes place in user-determined increments when the cursor is moved against the left or right margin.

The recently released version 1.1 ($1,600 per machine) has, besides the addition of horizontal scroll and the new documentation, a line numbering logic to correspond with EDIT/3000 and a ":" command to execute MPE commands during an editing session.
Contact Speier Associates, 1720 Section Rd., Suite 111, Cincinnati, OH 45237; (513) 351-8888.

Circle 399 on reader card

Bradford Announces SPEEDEDIT C.02

Bradford Business Systems Inc. recently released version C.02 of its SPEEDEDIT full screen editor. The SPEEDEDIT system has been running on the entire line of HP 3000 computers since 1979. The current release has been updated to make several allowances for the Spectrum series of systems while at the same time introducing several new features.

One of the new features is the ability for the user to define a group search path and to have SPEEDEDIT search the various groups for a given file name if the file is not first found in the logon group and account.

Another enhancement deals with the way SPEEDEDIT handles syntax error trapping, the ability for SPEEDEDIT to trap errors flagged by the compiler and present the offending text for correction. The new release also includes the ability to readjust text so that it more evenly aligns with the user-defined right margin.

With the C.02 release are several new pages of documentation that describe the new features as well as capabilities such as how users can integrate the SPEEDEDIT system with their applications for the ability to readily edit text as part of a larger system.
Contact Bradford Business Systems Inc., 25301 Cabot Rd., Laguna Hills, CA 92653; (714) 859-4428.

Circle 398 on reader card

APPIC Updates StarJet/3000

APPIC has released A.02.00 of StarJet/3000, a forms management product for the LaserJet series of printers. The new release consists of two programs — StarJet/Design and StarJet/Action.

Design allows the creation/modification, in visual mode, of printout forms from any graphic terminal or PC such as the HP 2623, HP 150 or Vectra using HPTerminal. Text, logos, boxes, lines and shaded areas can be mixed together easily. Design generates a command file for Action.

Action is the core of StarJet/3000. It allows either translation of the command file generated by Design for direct printing on a system or attached LaserJet; or compilation of the form created by Design into an MPE "Environment" file directly accessible by your programs with a "file equation," hence merging data and form at execution time.

StarJet/3000 also includes procedures callable from any language allowing dynamic management of the most sophisticated forms such as those using bar codes.
Contact APPIC at (512) 346-0962 in North America, or 33-1-64-54-87-37 in Europe.

Circle 397 on reader card

Unison Software Enhances TAPES

Unison Software has announced an update to TAPES, the automated tape library system that is the HP internal worldwide standard. All known problems have been fixed in the

new release, B.01, and several enhancements have been added.

This new Spectrum-compatible release significantly improves functionality when more than one job or session is under TAPES' control at one time. Additionally, the scratch tape allocation program has been modified to greatly improve performance, particularly in a network environment or for large tape libraries.

TAPES now provides the option to print a label for a specific tape. The comments associated with a tape are available for printing on its label. Tape volume IDs no longer are restricted to numbers; the new release permits tape volume IDs to consist of any six alphanumeric characters and then ending in a digit.

TAPES now supports pattern matching in report selection values, allowing for rapid sorting through data. Other enhancements include an added copy of a tape mount request, a movable console and database capacity warning.

Contact Unison Software, 415 Clyde Ave., Mountain View, CA 94043; (415) 968-7511.

Circle 395 on reader card

RuggedWriter 480 Offers Two New Features

HP's RuggedWriter 480 printer ($1,695) now handles six-part forms and has a recommended maximum use of 5,000 pages per month. It prints up to 480 characters per second and has a 20,000-hour mean-time-between-failures (MTBF) rate.

The printer works with HP, IBM and IBM-compatible personal computers. It handles multipart forms, spreadsheets, letters and reports and has RS-232-C serial, Centronics parallel and HP-IB input/output interfaces.

There are three typeface settings and speeds: letter-quality mode at 240 cps, draft mode at 480 cps and compressed mode at 333 cps.

Contact the Hewlett-Packard Co. sales office listed in your telephone directory white pages.

Circle 396 on reader card

TekBase Now Available On HP UNIX Workstations

Test Quality Company has announced a significant enhancement to TekBase, the only database management system that handles the very large arrays of measure data found in manufacturing test facilities, engineering departments and R&D environments. TekBase now is available for HP 9000 Series 300 and 800 UNIX workstations.

TekBase ($5,000 and up) accepts information over LAN, IEEE-488 (HP-IB), serial and BP-IO interfaces, enabling engineers to send data directly from test instruments and data acquisition devices and perform mathematical functions on the data.

TekBase uses a special technical query language (TQL) to extract information. TQL has advanced computational capabilities such as statistical analysis, signal analysis and arithmetic and trigonometric functions, which operate on real numeric arrays. TQL also enables users to perform interactive ad hoc analysis on acquired data.

Contact Test Quality Company, 2316 Walsh Ave., Santa Clara, CA 95051; (408) 986-8880.

Circle 394 on reader card

Forest Renames GATEWAY/1000

Forest Computer has announced a change in the name of its multivendor gateway product. Formerly called GATEWAY/1000, the product has been renamed the Forest Network Processor.

The Forest Network Processor provides multivendor connectivity between IBM, DEC, HP and Unisys computers. Terminals on one type of host may access a "foreign" host as if they were a native terminal type. Additionally, the Forest Network Processor delivers file transfer, RJE, printer emulation and program-to- program services between its supported hosts.

Contact Forest Computer, 1749 Hamilton Rd., Okemos, MI 48864; (517) 349-4700.

Circle 391 on reader card

Continued on page 24.

HP's RuggedWriter 480 Printer.

New Drive Doubles Capacity/Transfer Rate

The HP 9145A ¼-inch tape drive, recently announced by Hewlett-Packard, features twice the transfer speed and cartridge capacity of previous HP ¼-inch drives. The drive will run on HP technical and small-business computer systems and provides from 67 to 300 MB of backup storage. A built-in version of the drive works with the HP 3000 business computer.

The HP 9145A has 133 MB per cartridge, up from the 67 MB available on previous ¼-inch drives by doubling the number of recording tracks from 16 to 32. The drive's increased capacity results in increased operating-cost savings. At 4 MB per minute, the HP 9145A has twice the data-transfer rate of HP's 16-track cartridge tape drives with a doubled tape speed of 120 inches per second.

The HP 9145A tape drive ($3,980) has two front-panel displays. One tells the user when to clean the read/write head and the other operates when the drive is loading or unloading a tape, letting the user know when to use the drive.

The HP 9145A can read tapes written by most HP 16-track tape drives, but will write data only to a 32-track tape. Other HP ¼-inch tape drives offer low prices and high capacity.

HP 9144A owners can trade in their current drive for the HP 9145A until October 31, 1988.

Contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.

Circle 376 on reader card

AdvanceMail II Lowers Cost for PC Users

HP's new AdvanceMail II ($410), an enhanced version of its electronic distribution and messaging system for PC users, has several cost-effective features that eliminate the need for a direct connection to the HP 3000 business computers, or the need for HP AdvanceLink, a file-transfer and terminal-emulation program.

PC users can create, edit, reply, forward and print messages "offline" from the HP 3000, thereby freeing up HP 3000 resources and offering lower data communication costs than HP DeskManager, an electronic mail system on the HP 3000.

Users need only go "online" to an HP 3000 to send and receive messages. Through HP DeskManager, PC users can communicate with other vendors' messaging systems, including IBM PROFS and DISOSS, Telex and systems using X.400.

Contact the Hewlett-Packard Co. sales office listed in your telephone directory white pages.

Circle 392 on reader card

HP's new ¼-inch tape drive runs on technical and small-business systems.

CCS Ships C++ For HP-PA

Corporate Computer Systems has begun shipping the C++ compiler for the HP-PA Series 800 machines operating under HP-UX. This version of C++ is a licensed port of the standard C++ 1.2 AT&T compiler especially modified to operate under HP-UX.

C++ is a compatible superset of the standard C language offering additional features to enable more sophisticated error-free programming. Designed as a pre-pass to the HP-UX C compiler, C++ is integrated into the UNIX environment found on the 800 Series computers. It produces standard relocatable modules and interfaces into the XDB debugging package at the C++ source code level. C++ users have all the facilities normally associated with the standard C language plus those added by C++.

Contact Corporate Computer Systems Inc., 33 W. Main St., Holmdel, NJ 07733; (201) 946-3800.

Circle 389 on reader card

DISC/Vital Soft Offer Product Interface

Dynamic Information Systems Corporation and Vital Soft Inc. have announced the release of a direct interface between Cogelog's end user report writer, VISIMAGE, and OMNIDEX.

The VISIMAGE-OMNIDEX interface will be particularly useful for those sites that have better online response and higher report throughput. The OMNIDEX interface will allow VISIMAGE users to access immediately the date of interest, speeding up selection and reporting by as much as 1,000 percent.

The interface will be distributed in the U.S. through Vital Soft Inc., a U.S. subsidiary of the product's European developer, Cogelog. European customers will deal directly with Cogelog and its distributors.

Contact Patrick Bayle of Vital Soft Inc., (800) VITALSOFT (848-2576) or (415) 965-4494; or Shelley Meiklejohn at Dynamic Information Systems Corporation at (303) 893-0335.

Circle 390 on reader card

Proactive Updates Q-GEN Report Writer

Proactive Systems has released a major new version of its Q-GEN report writer.

The new release includes a new "FAST" module for boosting performance still further on serial database reads, a new test mode option for previewing reports, a help feature that displays possible data set links in diagrammatic form, support of Lotus 1-2-3 file format for PC downloading and several other enhancements.

Contact Proactive Systems, P.O. Box 7102, Bloomfield Hills, MI 48302; (800) 356-7117; (313) 333-7200.

Circle 388 on reader card

Continued on page 84.

Until November 30, this one's free.

Now when you buy either seven HP 700/92 terminals or seven HP 700/94 terminals, you get an eighth one free.

Thanks to our advanced design and manufacturing technology, these terminals were already excellent values. Both are designed expressly for HP systems—with the ease of use, high readability, and top quality you expect from Hewlett-Packard. And for a short time only, the values will be even greater.

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HEWLETT PACKARD

CIRCLE 248 ON READER CARD

UNIX® Applications You Need Most

One software package brings more to UNIX environments than empty promises. The SAS System.

The SAS System is the #1 choice for data analysis. The SAS System is the all-purpose answer for researchers, statisticians, students, business analysts, and applications developers. The SAS System is backed by an industry leader.

Now we've teamed with Hewlett-Packard to bring you the SAS System under HP-UX. That means you'll get software that's powerful, productive, and **proven** for the applications you need most. On everything from single-user workstations to multi-user systems.

Superior Data Analysis

Reliable statistics are a hallmark of the SAS System, from simple descriptive statistics to complex multivariate techniques.

Monitor experimental data on a day-to-day basis. Compute analysis of variance for both balanced and unbalanced data. Perform regression analysis and build linear models. The SAS System's ready-to-run programs handle **any** data analysis task... in record time.

For your advanced mathematical and engineering applications, the SAS System offers an interactive matrix language. You can transcribe almost directly from statistical formulas to SAS statements, and operate on entire matrices of numbers instead of one number at a time.

Efficient Data Management

The SAS System reads data from **any kind of file**, in **any kind of format**. Then you can sort, merge, and concatenate data using common-sense statements.

File updates are easy, too. You can create customized panels that look exactly like your business forms, surveys, or laboratory logbooks...screens that speed up data entry and reduce errors.

Powerful Reports and Graphs

When it comes to communicating your findings, nothing succeeds like the SAS System. Create anything from simple lists to full-color graphics, often with just a few keystrokes.

Produce tables, charts, calendars, and other formatted reports. Or display your data in attention-getting graphs—from pie charts to 3D plots to prism maps.

Combine these SAS System applications any way you choose. Tailor them with customized front-end menus for individuals or groups. And port them easily between workstations or operating systems.

Try the SAS System Free for 30 Days

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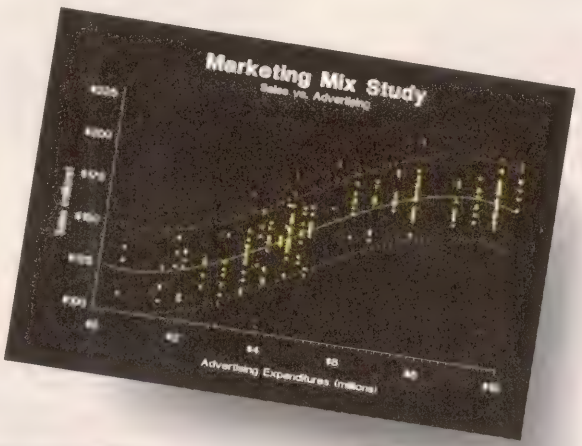

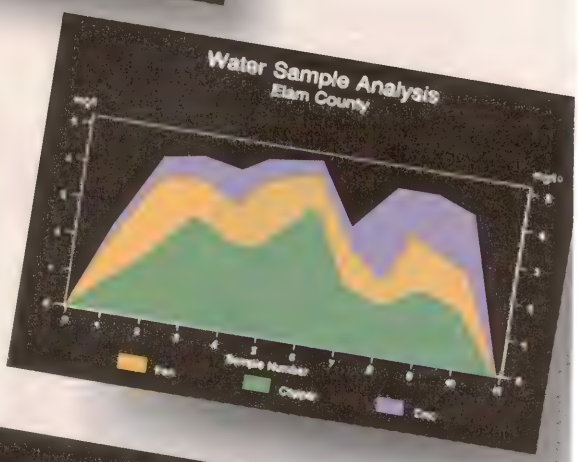

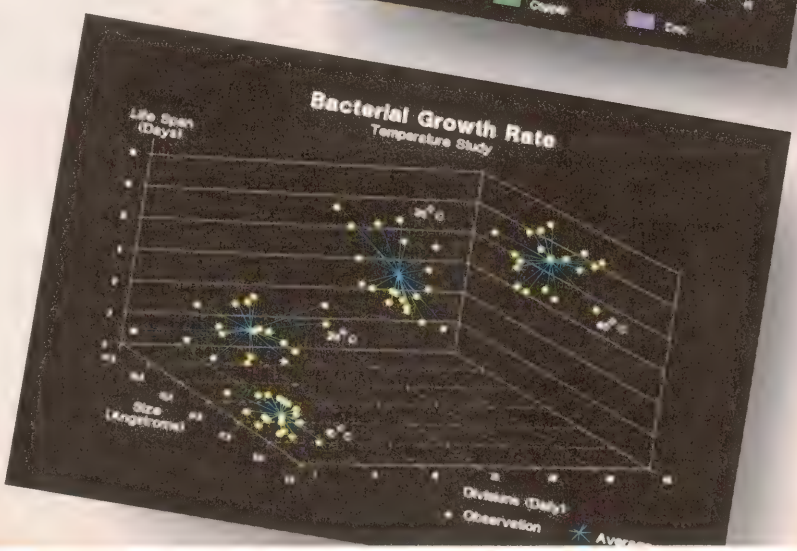

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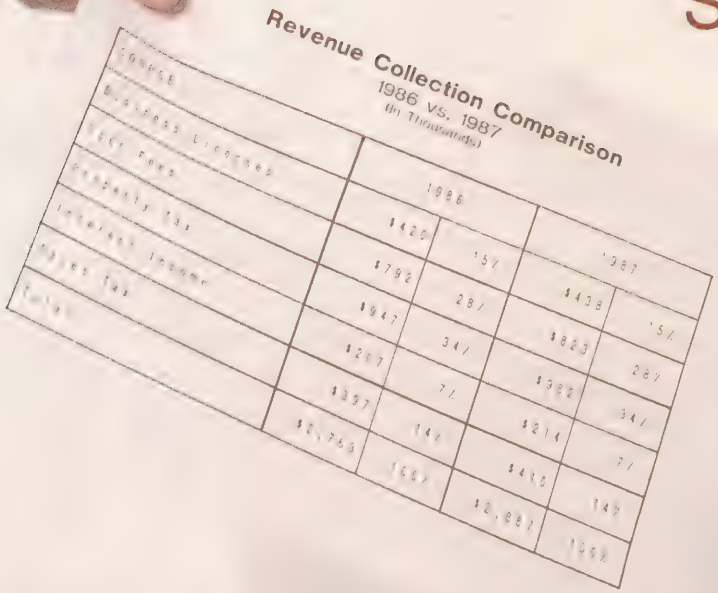

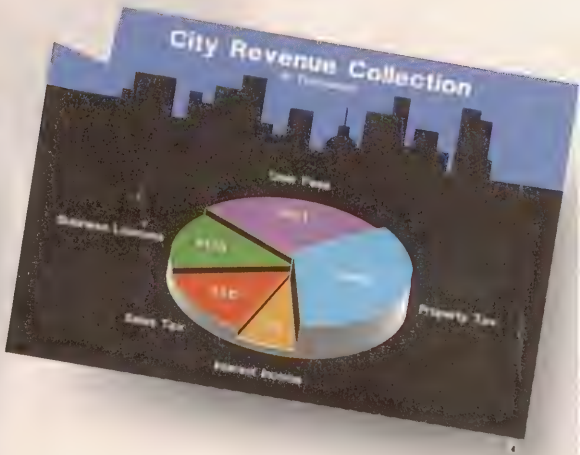

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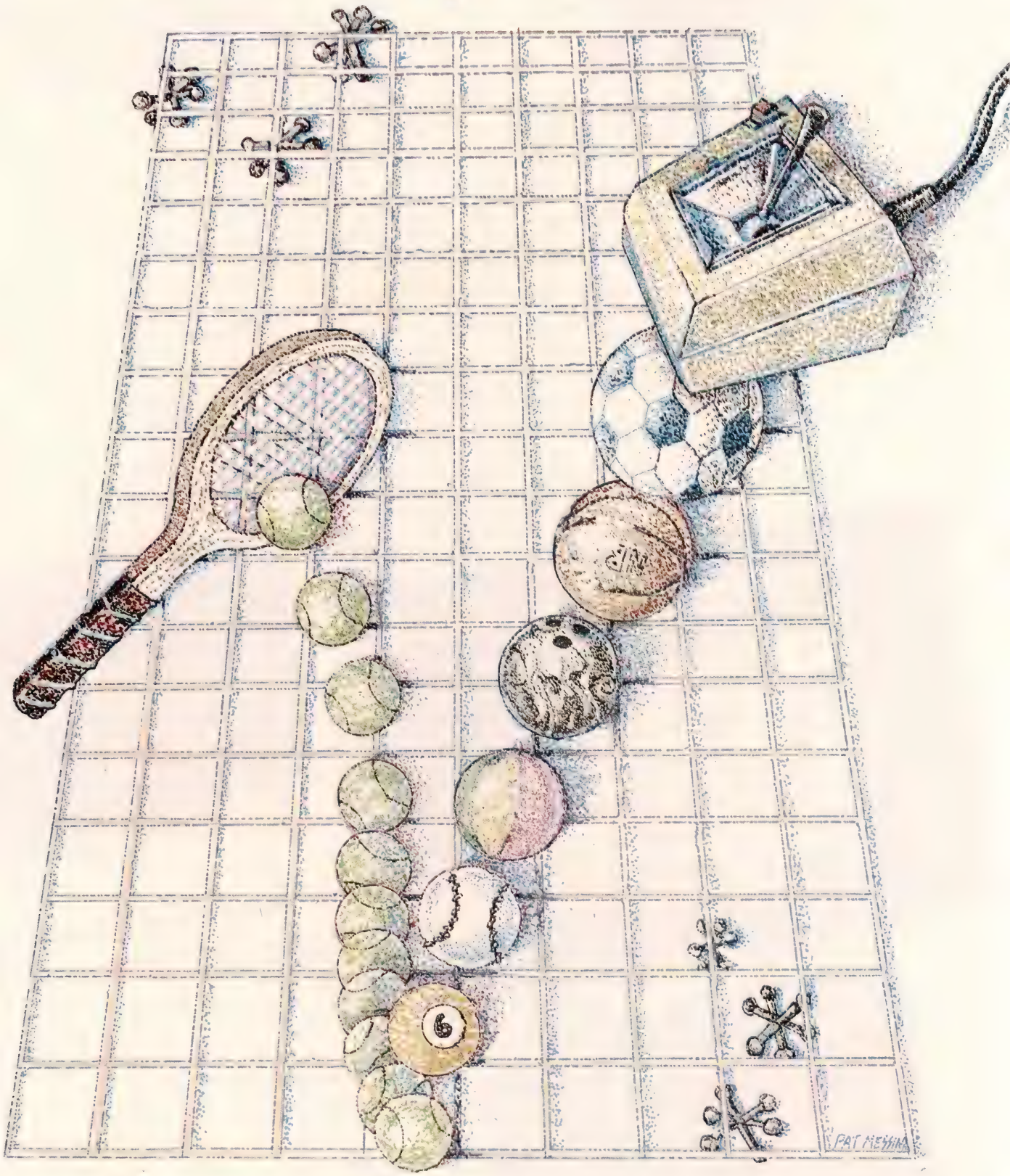


A Low-Cost X-Y Input Device For The Vectra

Fun, Games And CIM

[BY DON PERSON]

So, you're involved in computer-integrated manufacturing, and some of it is dirty business. Perhaps you could get by without a complete keyboard on the shop floor, or you think that the cost of "touch is too much." If you rule out both of these, the options for Vectra slim right down. Or how about another problem: You want to get some feedback from a single, low-resolution machine, but the cost of adding a precision-robotic or automation-input resolver simply is too much expense for the job. What can you do? If you're willing to take a page from the video gamers, I've got a great solution for you!

HP still has a group of customers who are or have been Series 80 users making the transition to Vectra in a slow, methodical way, skipping the more language-compatible but oh-so-proprietary Rocky Mountain BASIC. I know, because hardly a day passes without my finding another. One job in particular recently seemed worth doing for several reasons.

I was presented with the task of reworking a system that controls the packaging of powdered metals. Since the stuff was both conductive and abrasive, I spent some time figuring out how to set up a user interface that would not be a keyboard killer. The old reliable

HP-86 had spent its life in a box isolated from the work area, and now the challenge was to save some space and move the computer nearer to the scene of the action. I could find no "poke through" covers that exactly fit the Vectra keyboard, and overall reliability concerns made it impractical to use throw-away Taiwan Specials.

WHILE PUZZLING OVER what to do one evening, I watched my daughter enjoying *Rocky's Boots*. This is a PC-based logic-training game that really is fun for kids of all ages and teaches, in a general sort of way, the connection of logic gates. It goes so far as to use the right symbols, too. But that's not what I was seeing that night. She was using the cheapo Frankenstein's-monster clone PC that I made for her birthday. Unlike her Dad's Vectra, her computer has a joystick. That gave me the inspiration. It's funny how you can see the obvious and still miss it.

> In short, there was nothing required that couldn't be handled simply and economically with my daughter's joystick.

HP doesn't offer a joystick for Vectra, since some exceedingly wise human along the way decided that joysticks were for fun and games. We already know that "fun" does not come up too often in conversation over at "Mom's place." I can't find any occurrences of the word in HP literature this year either. Here is your chance to take a fun input device and use it for something serious.

But back to business. The way that operators used the original control system was pretty simple. Driving it amounted to nothing more than using cursor arrow keys to select one of several monitored functions and then holding the "+" or "–" key to move the limits.

And now for the real payoff. The original design used a pair of RS-232-connected interfaces, one of which I decided could be replaced. The other simply could not be removed, since there was far too much attached to it. The second unit would end up in close physical proximity to the computer and only report the location of two linear-positioning potentiometers and an over-travel switch.

When you break free of convention, there is no sense in going halfway. The basic game-port card can handle four potentiometers and four switches. This equates to dual joysticks for gamesters, but to me this meant one joystick with buttons for the operator and one pair of machine-position sensors with limit switch inputs. Above all, it promised one less machine interface dangling from a serial port.

In short, there was nothing required that couldn't be handled simply and economically with my daughter's joystick. It took just one look to decide that this was the new input device, so on the job sheet it became: "One ruggedized industrial X-Y pointing device with two momentary switches."

Her joystick, you see, is a wonder of modern ruggedness. The base of the stalk is enclosed in a sealed rubber boot. The button area is covered by a membrane, built ruggedly enough to withstand the abuses of Coke and kids. That's plain English for "it resists harsh environments." The best part is that it costs $19.95.

Next stop? Why, the clone-parts emporium, of course. Actually, I shopped by mail, but within days I had two samples of game-port cards and another brand of stick. You'll be interested to note that the more expensive game board I purchased was $23. Now, with less than $50 in parts tied up, it was time to interface the goods to Vectra.

IF I WERE WRITING THE control code in one of HP's supplied languages, such as MS-BASIC, I could use combinations of the STICK function — ON STRIG () and STRIG statements. This is listed as officially supported in Vectra BASIC, even though no stick is on Mom's price list.

In any event, there is a better way to do it. Do yourself a favor and just forget about Vectra-interpreted BASIC altogether. Instead, I recommend True BASIC to anyone who has ever used HP-BASIC and wishes to move to the Vectra with some semblance of structure. Because the project already was coded in this language, I found it incumbent to produce a joystick interface for this job.

True BASIC

IF YOU LOVED HP ROCKY MOUNTAIN BASIC or Series 80 BASIC and you've got a Vectra, the people in Hanover, NH, have a good thing for you. I can't praise True BASIC enough. It compiles to fast pseudo-code. It employs modern structures, is easy to maintain, is extra friendly at compile time, features IEEE math standards and is very extendable. In fact, it does everything well except wash the car and compile .COM programs. The runtime link library, which even the smallest program must be bound with, forces a minimum program to be 80K in size; hence, only .EXE code is possible. That's not too high a price to pay with lots of memory and fast discs.

Over the past two years, I've written HP emulation libraries in every area but graphics to ease the strain of conversion from HP lingo. Now that Better BASIC seems ready to fall by the wayside, I'm not about to switch to one of the "Johnny Come Lately" languages from Borland or Microsoft. I'll take any offer for my copies of Turbo BASIC and Quick

BASIC 4.0 thank you. Neither offers the implicit math accuracy, built-in matrix statements or quality big-string handling capability of True BASIC. TB, on the other hand, features genuine modules ala Modula II, and it's better by a mile for people who are engineers first and programmers second. I'll finish by saying that you owe it to yourself to check this out. I've seen TB discounted to as little as $60.

MS-BASIC has a problem when it comes to STICK support anyway. To find out what the stick does, the Microsoft ON STICK statement puts a nasty piece of end-of-line code between every line of the program to inspect the joystick port. This has to be done in the Gee Whiz approach anyway, since the game port does not have an IRQ hardware interrupt line at its disposal. This means that to keep a constant eye on its condition, you must poll for information.

That's what GW BASIC does, but the trouble is that it's always or not at all, unless you want to add explicit ON/OFF trapping in your program, which is a real performance eater. One option I could have exercised was to pick up an IRQ line with a little haywiring on the card. The second serial-port IRQ line is a great candidate. Then all we'd do is write an interrupt handler for ourselves. At that point there would be nothing to stop us from latching the button inputs, too. In short order, though, I'd have a non-standard card. This had two disadvantages:

- *It could result in non-standard systems; no off-the-shelf spares.*
- *Not everyone might be excited by the long-term implications of using customized cards and conventional programs that expect a standard port.*

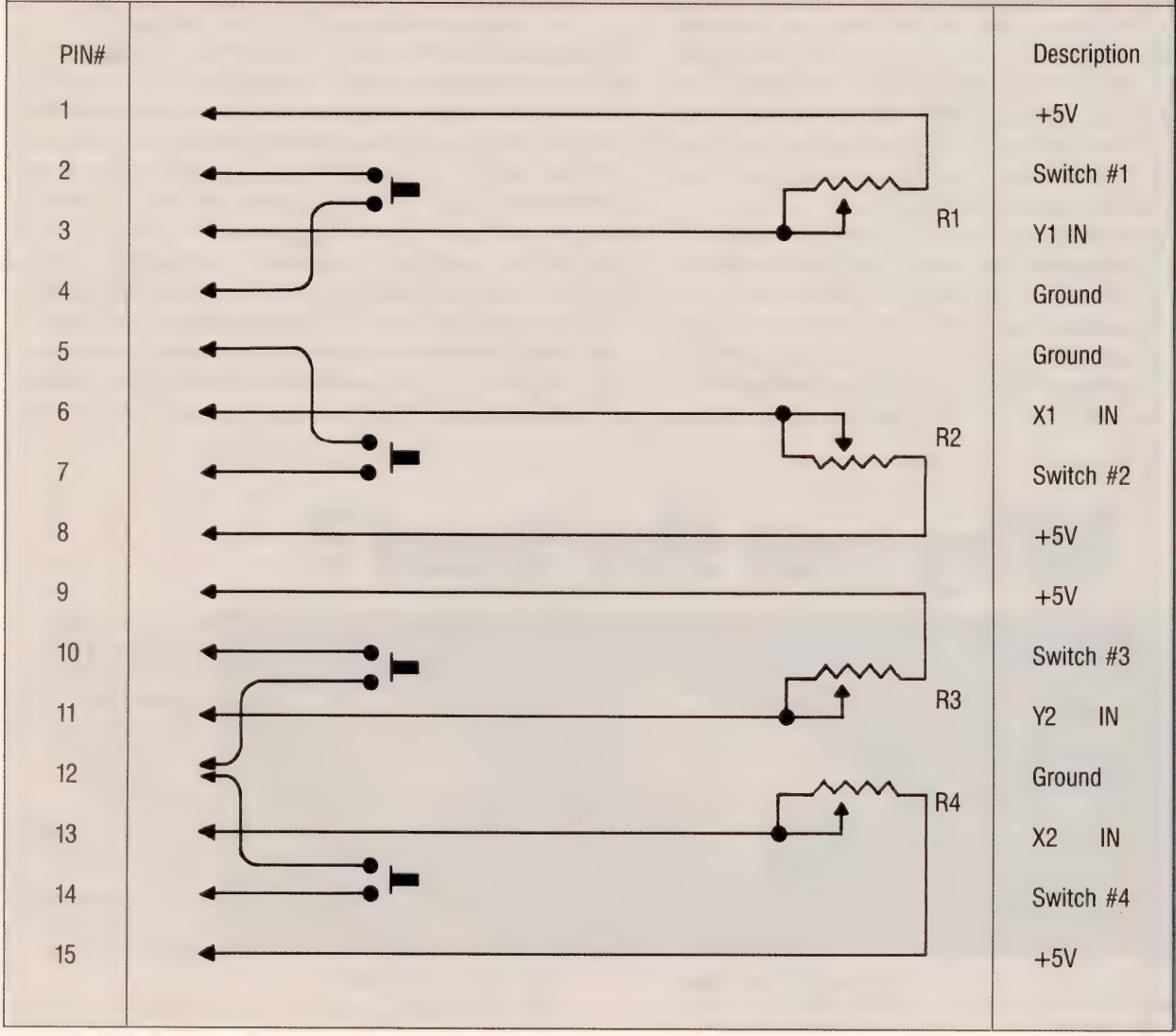
Not to worry. Because of the Vectra ES's speed and the very high overall efficiency of True BASIC in this application, the program spends most of its time waiting for input anyway. I already was using a background-interrupt serial-port handler, so there was no problem with simply scanning the stick port until the serial-communication subprogram reports an EOL followed by "sync idle." At that time we would scoop up whatever we'd received on that port, and the rest of the time just poll the game port. The scanner, in effect, becomes the program's main idle loop. By combining one machine sensor with the stick input, I also was guaranteed fresh-position data concurrent with operator control. And remember, in the process I was saving an entire serial-communications channel.

While it is possible to write the actual stick routine in TB,

FIGURE

Game Port Connector Wiring

Pots R1 — R4 Suggest Range 5K — 50K Depending on Sample Width and CPU Clock.

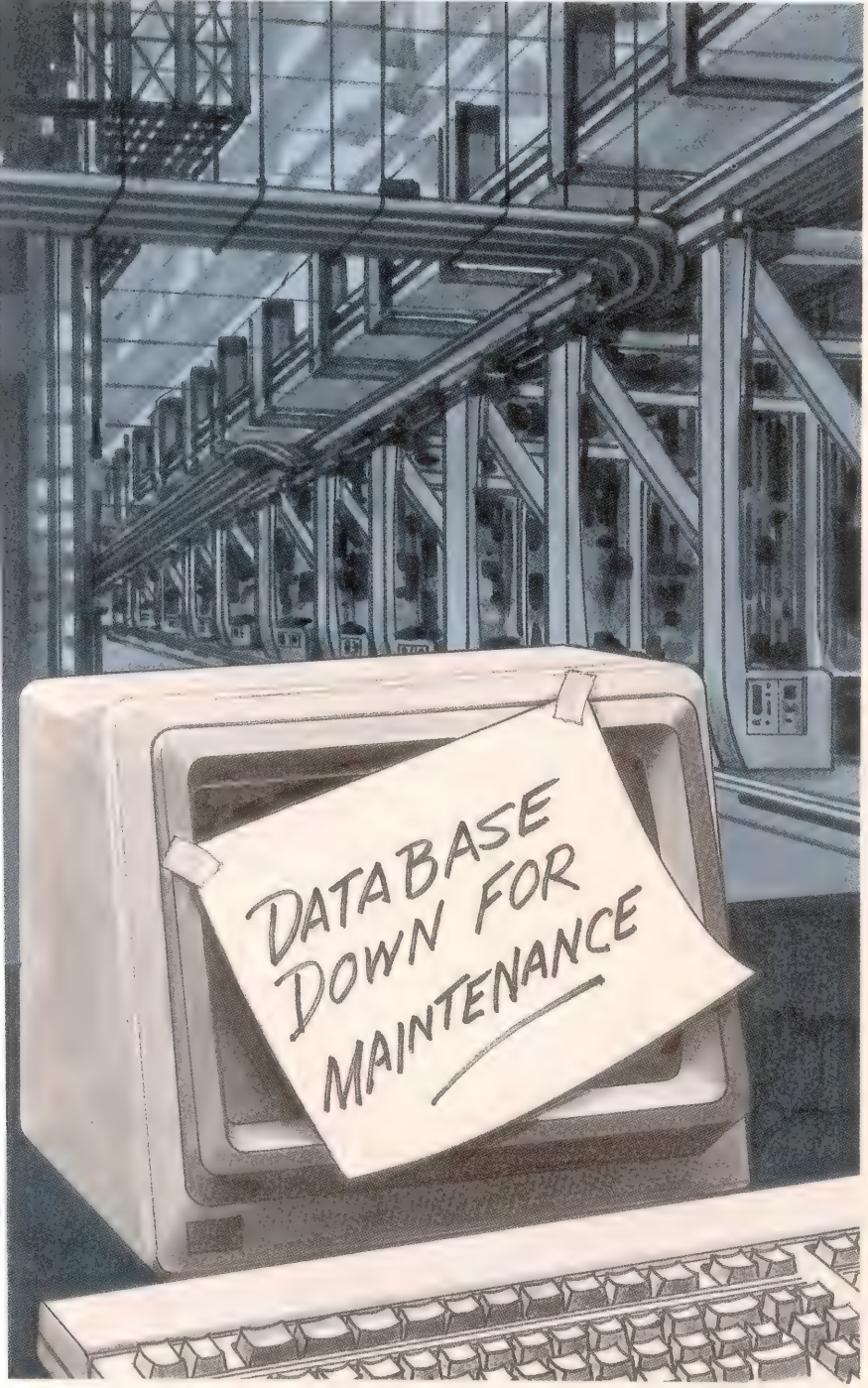


I coded it in assembly language for highest speed. The bonus to you is that by changing the header to match your favorite language, you can make it work with anything else you may happen to use. Modifying it for C is no problem either.

AT THE HEART of the card itself, you have four one-shots and four switch-debouncer circuits. Sending any data out of the game port triggers the monostables, and you time how long it takes for each of the circuits to time out. The time is proportional to the resistance wired across the one-shot. No resistance means no return to zero during the timer loop (see *Figure 1*).

If nothing is connected, the check loop will time out during the test interval and the returned result is zero. You can scale the resistances or the loop time, but excessive loop times should be avoided since for all but hardware interrupts this is an idle loop.

There is one other bit of caution in order. Be aware of



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the interrupt frequency of any background processes; this can throw off the results. Two serial ports running at 1200 baud can in the worst case add an interrupt every 4 milliseconds. Remember that this is meant to allow low-resolution input suitable for sticks and non-critical machine input, not high-res robotics.

Awareness of the possibility that aperture can meander suggests that the high-level call that reads the port save each reading until the next is found satisfactory. In this way, you can compare subsequent data transactions with the port as a percentage of known full scale and reject large deviations until a re-reading confirms any value that exceeds your arbitrary maximum change-per-measurement period.

Because of the good degree of standardization I've found,

Program I.

```
;  JOYSTICK   interface to True Basic
;
;  D.E Person  Released for non-commercial use 2-29-1988
;
; Adding a GAME port to VECTRA :
;
;       Port is Located at HEX 201  as a single register
;       The top 4 bits decode the state of four push buttons
;
;       A zero in bit position 7,6,5 or 4 denotes a switch closure
;       NOTE: These are not latched, so if the hit is too quick, you might
;       miss. I sample  the switches twice , before triggering stick timers
;       and again before final exit. I 'AND  the results of the 2 samples
;
;       The lower 4 bits ( 3-2-1 & 0  ) correspond to 4 one shots , connected
;       to "x-y" elements of both joy sticks. These are psuedo x-y in that
;       returned values are proportional to resistances that are quite
;       NON-linear. here is the map.  MAX = 255
;
;           .
;       y,x                                 y,x
;       1,1                                 max,1
;              :====================:
;              :                    :
;              :                    :
;              :                    :
;              :          X         :  <-- = ~ .33 max
;              :                    :
;              :                    :
;              :                    :
;       y,x    :====================:    y,x
;       1,max                               max,max
;
;  A "0" value  denotes NO stick plugged in
;
;   results will be in the range of 1-255
;   Used as follows:
;   call Joystick (string$ )
;
;
;      You must pass a string of 5 or more bytes
;      results are pased out as follows:
;
; BYTE# 1  switch positions are sent in the top 4 bits others are set =0
;          zero in a bit position for a switch means it is pressed
;
;  answer format is [switchbits] [s1y] [s1x] [s2y] [s2x]
;  byte # in $      1          2    3    4    5
;  is the relative position value for each of two psuedo x-y locations
;
;      each has a word unsigned up to 255 for the value of the stick
;
;
bswap   macro   word                ; produce packb format numbers
        db      high word,low word
        endm
;
count   equ   0100h                 ; max count ever for a byte +1
code    segment
        assume  cs:code
        org     0
;  REQUIRED PREFACE FOR TRUE BASIC LINKER RECOGNITION
        db      0d4h,043h           ; compiled file header
        dw      0                   ; high word of length
        bswap   <offset joyend>     ; set length of routine in PACKB order
        db      0,61h               ; indicates assembly language
        bswap   8                   ; length of name
        db      "joystick"          ; name
        bswap   3                   ; length of type
        db      "ss,"               ; attributes for TB linker

joy     proc far
        cmp     byte ptr cs:[scalar],0  ; is scale factor set ??
        jnz     deref               ; if not, go calculate first
        call    setscale
deref:  les     di,[bp]             ; point to string result arg pointer
        mov     es,es:[di]          ; dereference
        mov     cx,es:[4]           ; get CX = length of I/O argument$
        cmp     cx,5                ; big enough place for answer ??
        jae     morj                ; exit @ next inst if not
        ret
;                                     data save area for scale factor
scalar  db  0                       ; shift scale factor
morj:   xor     ax,ax
        mov     di, 9               ; di set for 2nd byte of string
        stosw                       ; clean first 2
        stosw                       ; clean 2nd pair
        mov     di,8                ; now point to first byte
;
;  prepare for data reception
;
        mov     cx,count            ; max unsigned count
        dec     cx                  ; precompensate insures 1 as min answer
        mov     dx,0201h            ; gameport  address
        in      al,dx               ; get switch readings first
        and     al,240
; mask off low 4 bits ( 1 shot timeouts) stosb
; send to string ... switch ON=0 bit
;       DI now points to byte # 2 of $$
;  trigger the one - shots process port receipts
;
        mov     bl,15               ; set initial mask
        out     dx,al               ; sending data triggers mono stables

;                       enter the loop for testing the one shot ending times
rloop:  xor     al,al               ; waste time
        in      al,dx               ; read ports again
        jmp     $+2                 ; delay
        nop                         ; allow port to respond on ES/Series
        and     al,bl               ; mask off switches-look at one shots
        cmp     al,ah               ; save extra compares
        jz      skipit
; see which bit is done timing now
```

I feel that any game card you buy will work just fine. The only possible exception would be very old versions manufactured before LS TTL came into wide use. I don't think you'll find anything that old on the market today.

I've included a simple demo program to show what you get from the stick more clearly than my rambling on about it. Technical information on the game port also is included.

One other thing: This code is fast enough for you to hack around with games on the side — only don't tell the company that built the Vectra about the fun parts. *—Don Person is an independent consultant based in Albany, NY.*

Program I. . . . CONTINUED

```
        mov   ah,al                 ; save last byte for later compare
        push  dx                    ; save port address on stack
        xor   dx,dx                 ; dh has the mask for bl testing
        inc   dh                    ; dl has the joystick offset num:  0-3
nextik: shr   al,1                  ; shift down 1 st bit
        jc    bit2
        test  bl,dh                 ; have a 1   OK o measure this ??
        jz    bit2                  ; not allowed bit
        push  dx                    ; save mask in registers again
        xor   dh,dh                 ; cancel hi part which was the mask
        mov   si,di                 ; find index in $ for this timer #
        add   si,dx                 ; add the prot number to offset
        mov   dx,count              ; get starting count
        sub   dx,cx                 ; get major loop count diff, unsigned
stowit: push  cx                    ; save loop count
        mov   cl,cs:[scalar]        ; get divisor
        shr   dl,cl                 ; scale result
        pop   cx
        cmp   dl,0                  ; make it zero ??
        jnz   away
        inc   dl                    ; make it one
away:   mov   byte ptr es:[si],dl   ; set count difference into ans $$
        pop   dx                    ; restore the port address in DX
        not   dh                    ; mask removes bit for timer just read
        and   bl,dh                 ; dh  unset look for low bit
bit2:   inc   dl                    ; next joystick bit
        shl   dh,1                  ; move to next timer bit position
        cmp   dh,16                 ; have we done all 4  yet ??
        jb    nextik                ; 8 or = is ok (1-2-4-8) are the steps
        pop   dx                    ; back to port address
skipit: cmp bl,0                    ; all done ??
        jz  bye
        loop rloop
;
;  take a second look at the switches for a hit
;  note: no further masking needed since the $ byte was ANDed before storage
;
      in      al,dx                 ; one last peek at switches
      and     byte ptr es:[8],al    ; set over the switches on exit
bye:  ret                           ; all done
joy   endp

;       how many clocks between ticks ??? Uses sysclock 18 tick/sec counter
;       to produce a scaling factor
;       divisor is 4096 to get shift integer as a power of 2
setscale proc near
        xor   ax,ax                 ; make code zero
        mov   bx,ax                 ; init count to zero
        int   01ah                  ; get time
        jmp   timer2                ; save low count
timelop: xor  ah,ah                 ; make code zero
        int   01ah                  ; get time
        pop   cx                    ; recover old lo order ticks
        cmp   cl,dl                 ; same tick as the one we saved ??
        jnz   deltaT                ; got a new edge so exit
timer2: push  dx                    ; save lo order ticks
        jmp   timelop
```

```
;
; stack clear on entry
; now count the cycles through this loop to estimate processor speed
;
timelp: xor  ah,ah                  ; zero since bx is counter now
        int  01ah
        pop  cx
        cmp  cl,dl                  ; same tick ??
        jnz  countup                ; got a new edge
; ad up counts of the loop
        inc   bx                    ; detect RS or 20 mhz'286 ovflow -FFFFh
        jc    fast_
deltaT: push  dx                    ; save new time
        jmp   timelp
fast_:  xor  bx,bx                  ; make big divisor
        dec  bh                     ; 32768
countup: xchg bh,bl                 ; get bits in proper order for shift
        mov  cl,13                  ; = binary divide
        shr  bx,cl                  ; do the integer division to scale
        mov byte ptr cs:[scalar], bl ; store scale factor
        ret
setscale  endp
joyend:                             ; end of code len marker
code    ends
        end                    ;

! \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
! ++++++++++++++++++++++++++++++++++++++++++++++++

! DEMO Joystick Interface code
! DE Person  2-1988
LIBRARY "joystick.trc"              ! include our Assembly language IFC
CLEAR
SET CURSOR "off"
FOR j=0 to 3
   SET CURSOR 1,j*10+1
   PRINT " But #"&str$(4-j)&"=";
NEXT j
SET CURSOR 2,1
PRINT "y1        x1        y2        x2"
CALL packb (a$,1,48,0)              ! 6 byte $$
!   buttons  come out  as 4-3-2-1 --->>
DO
  CALL joystick (a$)                ! get joystick buttons and position sample
  FOR j=0 to 3                      ! show what we have
     IF unpackb(a$,j+1,1)<>1 then SET COLOR "black/white"     ! inverse
video
     SET CURSOR 1,j*10+9
     PRINT " ";
     SET COLOR "black/white"
     SET CURSOR 3,j*10+1
     PRINT using$("###",ord(a$[j+2:j+2]))
     SET COLOR "white/black"    ! return to normal white on black
  NEXT j
LOOP until key input                ! demo till a key is pressed

END
```

HP's INDUSTRIAL APPLICATIONS CENTER

Solutions For Work Cell Control And Area Management

In December 1986, Hewlett-Packard set up the Industrial Applications Center (IAC) in Sunnyvale, CA, to focus on solutions and tools for work cell control and area management. Through the IAC, HP brings together third-party software products, consulting services and HP-developed industrial precision tools.

The IAC's target platforms are the HP 9000 workstations, the Model 825 used as a cell controller or area manager and the Model 840 as area manager. Despite the emphasis on workstations, HP recognizes there are many manufacturers who use the HP 1000 as "the workhorse of the factory." Therefore, the IAC's consulting services also include solutions involving HP 1000s as cell controllers.

A key reason for forming the IAC division was to involve vendors earlier in the process of planning for automation. HP divides the computer-integrated manufacturing (CIM) process into numerous steps. Early planning and project selection phases are called the strategic phase. Steps that involve software development, implementation and monitoring are referred to as the tactical phase.

The IAC division hopes to encourage manufacturing customers to bring in HP during the strategic planning phase so that customers can benefit from HP's manufacturing expertise and first-hand information about third-party vendors. For target customers in industries such as aerospace, chemicals and pharmaceuticals, industrial equipment and automotive products, HP offers consulting and systems integration in connection with Value Added Businesses (VABs) and systems integrator consultants.

[By Peggy King]

Value Added Businesses

VALUE ADDED BUSINESS is the term HP uses for third-party vendors, and the national accounts program is the selection process through which these vendors qualify to be recommended to HP customers.

HP has established several levels for VABs. All VABs associated with the IAC have software products that run on HP computers, and these products are included in HP's technical software catalog. A VAB with a product in the catalog is referred to as a listed vendor. Before a listed vendor can move up to the level of referenced vendor, at least six HP customers must have given a favorable recommendation of the product.

An intermediate step on the path to becoming a national account is for a VAB to become a regional account in one of HP's four U.S. sales regions. At the regional level, HP's regional sales force and

customer engineers receive product training in order to promote the VAB's product more effectively for customer solutions.

There is a rigorous qualification process for VABs to qualify as national accounts. When a VAB's software product achieves national account status, the product training for HP salespersons and customer engineers is expanded to include the entire U.S. and some overseas sites.

Some national accounts are authorized to resell HP products. Through the IAC, HP acts as a marketing partner to promote the national account vendor's products. Monitrol/UX, a product from one of the national accounts, Hilco Technologies (St. Louis, MO), has a product that appears in the HP corporate price list.

Tools For Industrial Automation

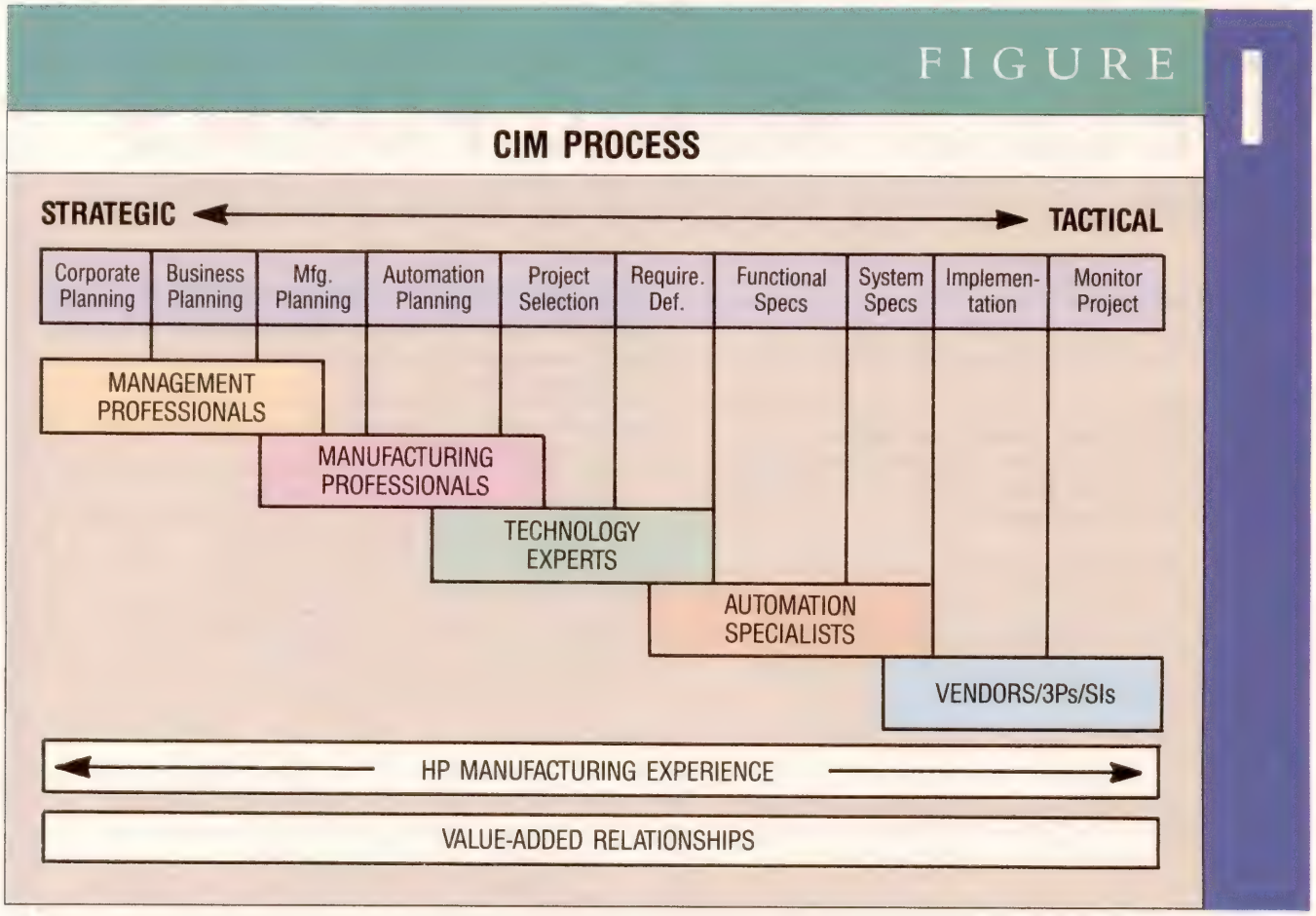
ANOTHER ASPECT OF THE IAC'S mission is to provide application development tools for industrial automation customers. The Industrial Precision Tools project came about as the result of a customer survey HP undertook in an attempt to find out which tools were most needed.

The greatest number of customers responding to the survey mentioned the need for database-management software, so HP developed a real-time database for controllers, robots and instruments linked to HP-UX area managers. Industrial applications need high-speed database access to accommodate large amounts of cell-control throughput. The telecommunications industry needs high-speed, real-time databases for fast transmission of data packets.

Customers had been spending too much of their development time writing real-time databases suitable for their environment; the IAC's solution is HP Real-Time Database, a scalable database that can be used in different network configurations. The memory-resident database is especially suited for industrial automation as well as for the telecommunications industry. HP began shipping its real-time database on July 1. (See the "News & Trends" section of this issue for more information about HP's Real-Time Database.)

Survey respondents also said they needed graphics tools for building user interfaces. HP's response was to develop HP Interactive Visual Interface, an industrial precision product that will be available later this fall. This tool, which runs within

FIGURE



the X Window System, allows users to create their own symbol libraries.

X-OPEN uses the term widget for the text and icon combinations that can be created with the Interactive Visual Interface. Because text, widgets and graphic displays can appear together on one workstation screen, automated factory sites can eliminate the use of multiple terminals for monitoring. Widgets are especially useful in industrial automation environments because dynamic conditions and alarms can be defined and associated with visual objects.

Another need that customers mentioned frequently was the need for standard communication interfaces. The IAC responded with an industrial precision tool called HP Device Interface System, which becomes available this fall. This toolset is used by programmers and systems integrators to link factory-floor devices and subnetworks to HP 9000 Series 800 computers. (For more information on the Device Interface System, see "What Is CASE?" in the August issue.)

Customers seeking tools and software for HP workstations in a multivendor environment can enlist the help of the IAC to match them with a prequalified systems integrator. The IAC Program organizes teams consisting of HP industrial automation specialists, manufacturing customers, and systems integrators, outside consultants, such as Coopers and Lybrand. These teams work together with customers during the strategic planning phases of computer-integrated manufacturing projects.

The customer contributes knowledge of the operations and procedures currently used. HP provides workstation platform and HP-UX, industry-standard networking, industrial precision tools and internal consultants. The systems integrators give expert advice about integrating products in a multivendor environment, analyze the customer's business, establish technical and project management requirements and find the best applications software suited to the customer's industry.

When the team is assembled, the IAC works with the customer, the systems integrators and other vendors to plan automation, integrate hardware and software and to provide support and tools for all stages of the software lifecycle including post-implementation support. *—Peggy King is an independent consultant and free-lance writer based in San Jose, CA.*

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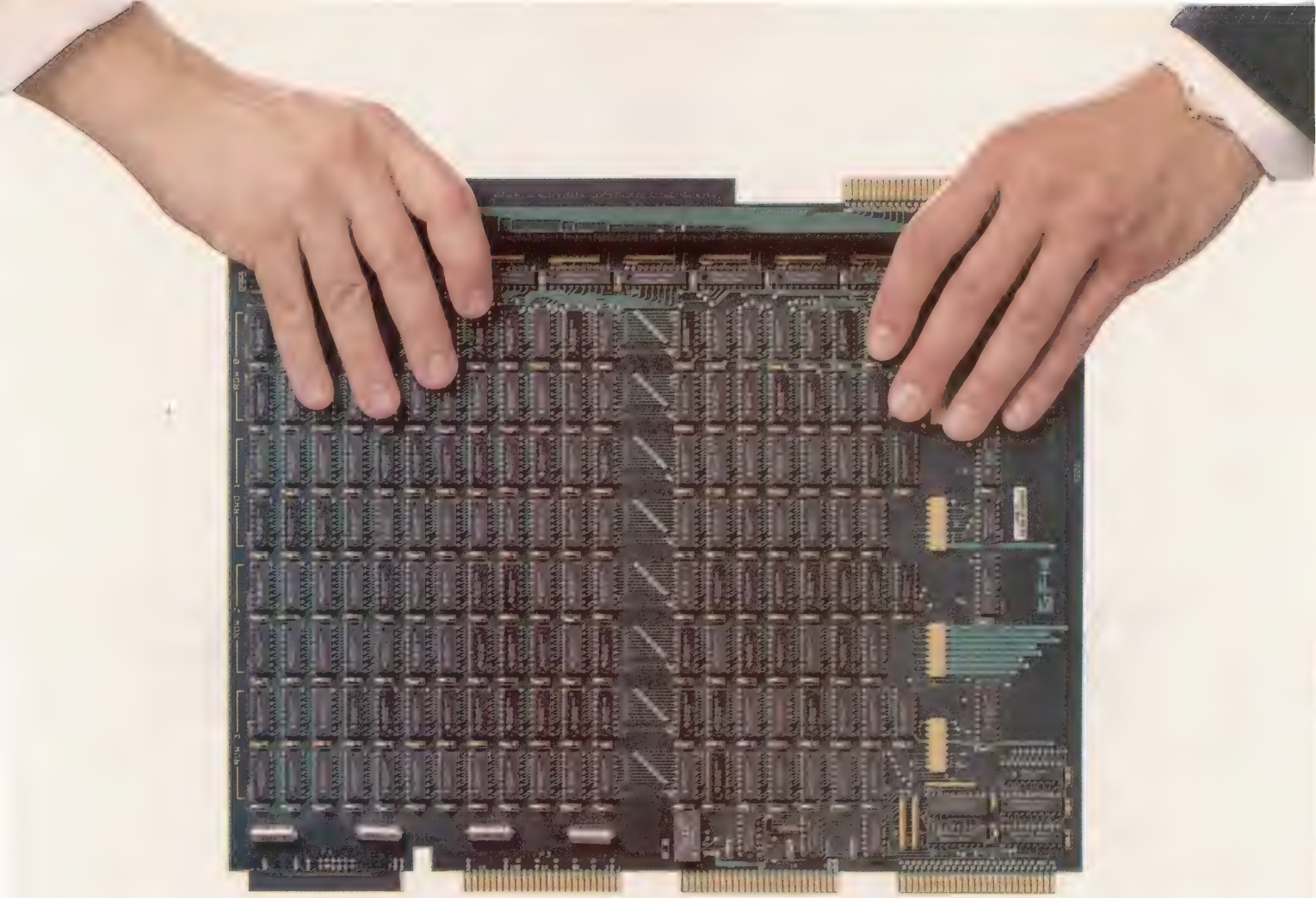

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The Origins Of CIM At HP's Roseville Terminals Division

Competing WORLDWIDE

[By Lynn Peffer]

A company must constantly examine the effectiveness of every facet of its operations, developing and refining both its work force and products. At a time when many Americans lack confidence in our ability to manufacture products cost-effectively to compete with items produced outside the U.S., Hewlett-Packard has answered this challenge. Utilizing teamwork and computer-integrated manufacturing (CIM), HP's Roseville Terminals Division (RTD; Roseville, CA) has succeeded in manufacturing a family of computer terminals, the 700 Series, which now compete on a worldwide basis in both quality and price against terminals manufactured in the Far East and Europe.

Encountering a declining market size for its HP terminals, RTD faced two alternatives: seek an offshore original-equipment manufacturing (OEM) alliance, or revamp its own manufacturing, design and marketing expertise to remain competitive. HP chose to continue manufacturing computer terminals in Roseville.

"When we looked at the task ahead of us, we knew it wasn't just a manufacturing task, but a combination of putting together a world-class product design with a world-class process for producing that product, along with some very innovative marketing concepts," said Max Davis, Roseville's manufacturing manager.

The foremost goal was to keep the superior HP quality reputation intact, while

offering the product line at a low price, capturing new markets and new distribution channels, and automating through careful scrutiny all manufacturing processes. The formation of the "Frontier Team," which included members from R&D, Manufacturing, Marketing, QA, Finance and Personnel, provided the expertise to meet this challenge. The team took its name from the code name for the project, "Frontier," and assigned working names to the terminal products such as "Sierra" and "Maverick," identifying the pioneering spirit of the team.

Such teamwork has resulted in the 700 Series family of terminals, which includes: the HP 700/41 ASCII Terminal ($375), the HP 700/22 DEC VT220 compatible terminal ($495), the HP700/71 IBM 3191 compatible terminal ($695, as compared to IBM's priced at $1,295) and the HP 700/92 and 700/94 ($895 and $1,095, respectively).

Initially, the team worked out cost models to determine where the product costs were being driven from and found that about 80 percent of the cost was in materials. The team approached the selection of suppliers and components by expanding its supplier base from the U.S. to worldwide. "The gratifying news was that we found additional sources in the U.S.," said Davis. And rather than seek a component with predesigned lab specifications, the Frontier Team went to suppliers, reviewed their parts catalogues and located the most cost-effective quality parts.

The focus of the selections was to utilize high-volume components already produced by the supplier and find the appropriate fit for the terminal design, which optimized the supplier's own process and provided cost-effectiveness. Because the supplier flow directly impacts automation, ultimately the source had to be able to make accurate deliveries, in some cases daily, packaged to complement the automation project under way at RTD.

Photo 1: One objective at RTD is to produce products with an average manufacturing time of eight hours or less.

Photo 2: Roseville provides a manufacturing environment where customers can see HP solving common manufacturing problems.

Requirements for successfully automating operations demanded that the computer-integrated manufacturing (CIM) system be modular and flexible. After observing the use of the Bosch System in three to four applications already in use at HP ranging from hand-held calculator assembly to personal-computer assembly, the flexibility and efficiency of the system was thoroughly demonstrated. The Bosch System, supplied by Weldon Automation, was selected by RTD, and a Weldon application engineer assisted the team in configuring an efficient production line.

The CIM system is integrated with the design, material control and manufacturing systems. These links automatically can process new terminal design features added to the Frontier terminal family, directly from the design system to the CIM system. The majority of PC board assembly is performed in a "hands-off" insertion line supplied by Universal Instruments Corp.

Quality control has enhanced the benefits of automation as well. A statistical quality control system, developed in-house at RTD, produces real-time quality data and graphical analysis. Machine vision systems are incorporated throughout the automated process and provide monitoring of all products through various tests. These quality control systems withhold any failures for repair and engineering evaluation.

In order to automate efficiently, simplicity in design is

an imperative focus. The family of terminals incorporates only five major parts: the yoke; the CRT, the bezel assembly; the PC board; and the bucket. Only five screws are used on the terminals and are attached at final assembly.

The 700 Series family of terminals is designed with a very small number of components, only a few of which are unique to each model. This design concept streamlines the automated manufacturing processes. "The conceptual model turns out to be the most cost-effective way to manufacture. Don't change models, don't have multiple parts and don't have all of the complexities associated with that," explains Davis.

"We also tackled something with what we thought was a major innovation. One of the problems you always have is labels, sticking on labels, getting them on the squares. It's not a neat task for anybody to do day after day on hundreds of products," said Dave Struthers, an HP Process Engineering manager. The team decided to mold the end of the rear panel with all product and regulatory information common to the box. The CIM system drives an automatic laser that burns in all unique information, eliminating all stick-on labels. Touch labor is reduced further.

An additional change, which resulted from the team's examination of the processes, was the relocation of the terminal distribution site from Roseville to the San Jose (CA) site. The Personal Computer Distribution Operation Center already was established there and the efficiency of joining the HP Singapore keyboards with the Roseville terminals was practical and cost-effective.

HP's manufacturing site in Grenoble (France) also manufactures the 700 Series terminal family, because two locations can provide the best service to HP's international customers. Grenoble has developed identical operations and processes and serves the European markets very successfully.

Currently, Europe accounts for approximately 40 percent of HP's computer terminal business. Roseville and Grenoble material lists reveal very few variations in suppliers, which has proven to be the best method of material procurement and has streamlined materials management. "We didn't want to have two internal engineering groups trying to manage two different suppliers for the same part," explains Davis. "We wanted to leverage our volume from our suppliers at two sites worldwide for the best quality and the lowest cost."

Understanding what the customer genuinely wants is an essential ingredient of customer satisfaction, particularly when entering a new market. The Frontier team embarked on a massive research effort, utilizing competitive analysis to understand the exact needs of this research and strongly contributed to the successful design of the 700 Series terminals as well as their underlying automation processes.

The majority of the "hands-on" process steps remaining can, if needed, be automated readily. One of the interesting discoveries made by the Roseville group is that the more they would simplify things so that operation could be automated, the lower the motivational levels for automation became, simply because the few remaining manual processes became so

FIGURE 1

Overall Objectives For CIM Throughout Roseville's Manufacturing Operation

1. To increase the quality of our products and lower our warranty costs.
2. To increase the productivity of our manufacturing process.
3. To use our manufacturing area as a laboratory.
4. To provide a manufacturing environment where customers could see Hewlett-Packard solving common manufacturing problems.

FIGURE 2

Specific Objectives For CIM Throughout Roseville's Manufacturing Operation

1. Eliminate batch processing of work orders.
2. Develop the capability to assemble any of our products, one at a time, through our manufacturing process.
3. Produce our products with an average manufacturing time of eight hours or less.
4. Eliminate paper documentation and manual data entry.
5. Simplify the information systems required to run and manage the factory.

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easy and quick to do. The focal point for the selection of automation processes was on the labor-intensive and repetitive tasks, which, at that time, were performed by assembly personnel.

And what happens to the people who were a part of the previously manual processes? Because of the significant increases in manufacturing volume, most of them supervise the automated processes. Others have applied their skills in other essential areas, enhancing the efficiency of the HP manufacturing process. No layoffs and no transfers to other sites were required.

The overall divisional objective was to design and manufacture a line of terminals that were world-class competitive . . .

The goal of the Frontier team was not to accomplish an automation project. The overall divisional objective was to design and manufacture a line of terminals that were world-class competitive in terms of their manufacturing cost, so they could be competitive in terms of price and performance in the marketplace. The design and process evolved into an integrated endeavor and, after about two years of effort, the Roseville Terminals Division has achieved an impressive record. It has reduced the cost of raw materials by 40 percent. The number of part-types in the terminals has been reduced by 30 percent. The direct labor in assembly has decreased by about 66 percent. The time for a terminal to be built from start to finish was reduced from three days to somewhere between six and eight hours.

The Competition

THE COMPETITION HAS taken notice. DEC, for instance, waited to introduce its $565 terminal, built offshore, until the introduction of the HP 700/22 DEC Compatible Terminal ($495), in order to take the edge off the HP terminal introduction. Price increases among competitors' products that are made offshore were anticipated because of the Yen/Dollar ratio, but they have failed to materialize. And these HP products will experience further cost reductions because HP recognizes that its competitors will not stand still. The process of change in the old days, making an effort and sitting back, then watching the profits roll in, are gone. Competitors and new technology will continue to challenge your products, which is why HP spent $901 million on research and development in 1987.

The decision to manufacture the 700 Series terminal family in the U.S. has been a significant achievement. HP decided to compete with manufacturers in the Far East, indeed worldwide, entering new markets while automating its processes and increasing volume. *—Lynn Peffer is a free-lance writer based in San Jose, CA.*

FIGURE 3

Success At Roseville Terminals Division

Product:	Computer Terminal
Program Objective:	Cost Equal to Far East Competition
Tools Used:	Total Quality Commitment (TQC) Design for Manufacturability (DFM) Complete Teamwork
Results:	1. Direct Labor Reduced 67 Percent (R & D and Manufacturing) 2. Unit Volume From Facility Increased 6X 3. Part Count Reduced 30 Percent 4. Cost of Raw Materials Reduced 40 Percent 5. Time For a Terminal to be Built From Start to Finish Reduced From Three Days to Between Six and Eight Hours.

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IMPROVING The Manufacturing Process

CIM And AI For FMS

Besides undertaking massive reorganization to streamline operations and decentralize management, manufacturers are using computer-integrated manufacturing (CIM) to improve the manufacturing process. Let's examine several aspects and characteristics of CIM and AI, and their importance for creating better flexible manufacturing systems (FMS).

The term computer-integrated manufacturing (CIM) refers to the integrated use of computers in all sections of enterprise, from the planning of production, through the design and manufacture of a product, up to the ensuring of good quality. The interconnected functions of all processes are illustrated in *Figure 1*. On the process level, symbols represent the stations through which materials, individual parts, subassemblies, etc., pass. The terminals indicate that an exchange of information is necessary or possible at the individual stations.

The data connections between the most important sections and fields of tasks in CIM can be characterized as follows.

WITHIN SOLID MODELING-BASED CAD/CAM systems, a database of complete data on geometry and attributes can be created, maintained and used by all necessary engineering functions (including manufacturing engineering). For actual fabrication of the parts (using Numerical Control [NC] tools) and assembly of the complete product or logical subassemblies, the information on part geometries and relationships of parts to each other also must be passed to the machines on the shop floor.

Typically, this is done in the form of an NC language description of the machining operations required to create the part. In the future, using artificial intelligence techniques, machine controllers are expected to link directly with the product database to interpret the geometry and material information, and create their own instructions.

Information on such things as surface finish may be used to select appropriate tools. Other operations such as welding or fastening to other parts for more complex product structures also will be interpreted directly from the hierarchy of components in the database and their relationship to each other.

TO THE EXTENT that parts and products cannot be automatically manufactured from the CAD/CAM data, the design process can be used to facilitate semiautomated (or even manual) production. The design engineer, with a manufacturing engineer or, conceivably, the CAD system itself, can assign a group technology code describing the parts' basic geometric and manufacturing

[By Dr. Michael M. Dediu]

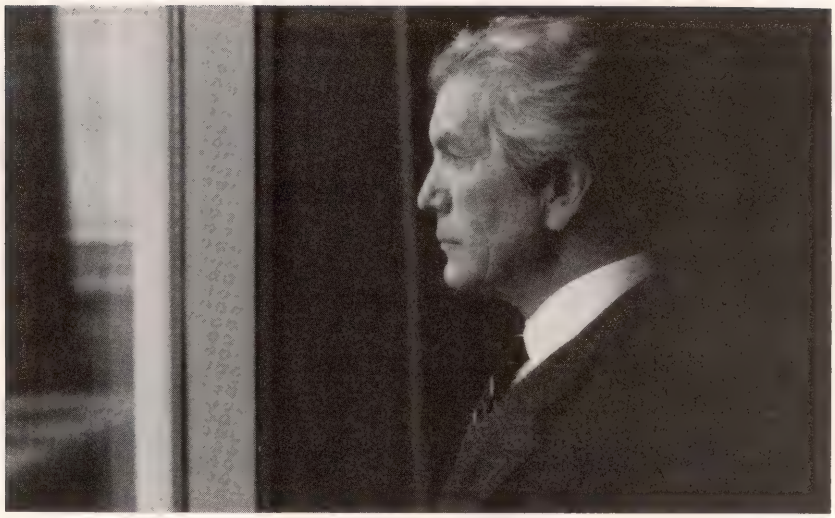

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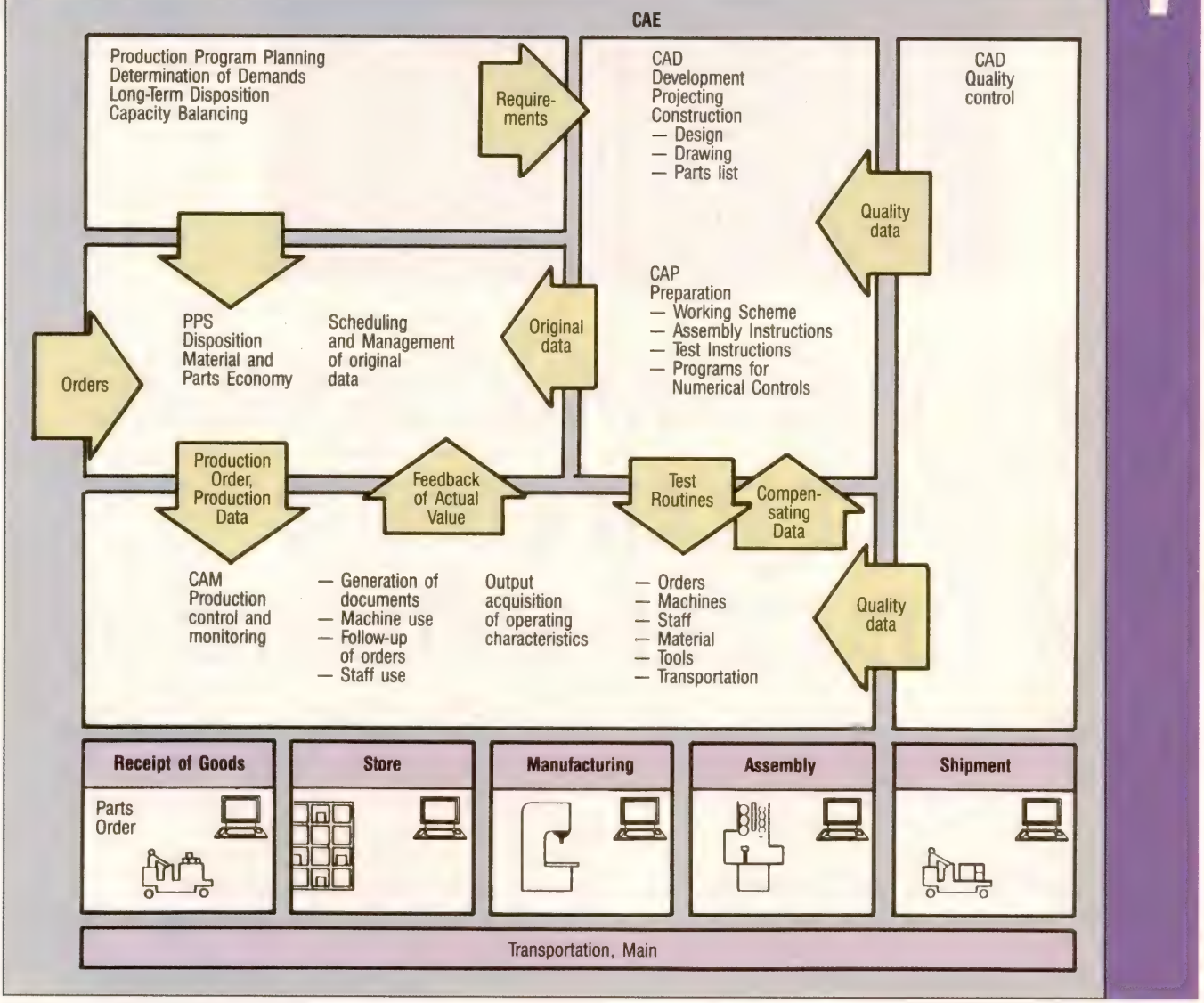
FIGURE I



The main functions of computer-integrated manufacturing.

characteristics. From this, a computer-aided process planning (CAPP) system can use its database and logic rules to generate manufacturing process plans (sometimes called routings or manufacturing data sheets). These might include data on the tools required, including any that are unique to the particular part, such as dies, molds or templates conforming to the part geometry.

The CAD/CAM system also should develop the complete product structure, or bill of materials, for the benefit of the material planning and control systems (MPCS). This information is needed for the material requirements planning (MRP) porting of the MPCS, which must explore the Master Production Schedule generated from orders received and/or finished goods inventory decisions into detailed production schedules and purchase orders for all of the component parts of the product.

Most complex products today go through many variations in their lifecycles as a result of special customer requirements or engineering changes to improve performance, reduce cost, correct errors, etc. (In some cases, such as commercial aircraft production, it easily can happen that no two members of a product family are exactly alike.)

Information of the effectiveness of engineering changes, by model/serial number, date of engineering release, date of manufacturing release, etc., must be maintained both in the engineering records of the company and in the production scheduling records. If these databases are separate (as is assumed for most present-day systems), this necessitates a flow of data back and forth concerning the specific configuration of all subassemblies and components of each model or range of serial numbers.

The different computer systems for the preparation and execution of production have to be interconnected in a way that will establish optimal flexibility in the entire range of operations.

Often, changes in the configuration of a product will be made by the manufacturing department, which may substitute allowable alternative components or vary the actual product design from what was specified by the engineering department (for various reasons of expediency), so it is important that this be a two-way data flow.

An obvious two-way linkage must exist between the MPCS systems and the manufacturing automation systems regarding the planned schedule of production to meet order requirements and the actual production results, which may differ because of machine down time, misestimation of operation time, unavailability of material, or many other factors.

In fully automated systems at both ends of this linkage, such discrepancies theoretically should not exist (i.e., machines are properly maintained or alternate routings found, inventory is prescheduled and therefore always available, estimates are corrected online); but, in practice today, the variations and consequent interactions of production scheduling are inevitable; hence, the bidirectional flow.

Inventory Availability

THIS TERM IMPLIES both the planned inventory of components and semifinished products generated by the MRP portion of the MPCS system, and information on the actual state of inventory and locations of times as determined by the manufacturing automation system (which actually controls the handling and transformation of material). This linkage is somewhat analogous to the scheduling information, but in this case it deals with physical counts, locations, movements and transformations of inventory from one state to another.

With full feedback from the production automation equipment, data on reflects, scrap and consumables (lubricants, coolants, etc.) can be monitored, as well as usable parts and products, so complete control of all material can be maintained.

Just-In-Time (JIT), or kanban, is a technique used to cut inventories and improve product quality. Primarily, it means software to manage inventories, to keep track of goods in warehouses and to schedule shipments and deliveries.

JIT means that the material to make a product arrives at the production line just as it's needed. The goal is to eliminate the 30 percent of the total production cost that American manufacturers spend on functions like warehousing and inventory maintenance.

JIT is a manufacturing concept that views anything not directly adding value to the product as a waste that ought to be eliminated. This simple approach means using the absolute minimum amount of equipment, labor, materials, space and time necessary to add measurable value to the product.

On-time delivery is helped greatly by computerized tracking and scheduling systems. Many aspects of JIT are so complex and so interrelated that they can be managed only on a computer.

Improving quality is a key goal of JIT. Material arriving just in time to a production line had better be of satisfactory quality. A few defective parts will shut down the line because there is little or no backup inventory.

It's computers that make JIT work, just as it was computers that drove the first modern manufacturing control system, materials requirements planning (MRP). Some practitioners believe it was MRP, which has been around for 20 years or so, that set the stage for JIT.

The different computer systems for the preparation and execution of production have to be interconnected in a way that will establish optimal flexibility in the entire range of operations. This can be done with the aid of local area networks (LAN).

In a spatially delimited range, a LAN includes workstation-related systems, which can communicate, for example, through coaxial cables or fiber-optic light guides. By means of such networks, it is possible to interconnect devices for the processing, storage or representation of information as a system in such a way that specific tasks can be assigned to individual cooperating system components. In this way, free

access to various data or program ranges can be provided to users.

MAP (Manufacturing Automation Protocols) is a set of protocols for a broadband communications network to integrate a factory. It will generate new business for system integrators using HP computers.

MAP is a subset of the developing Open Systems Interconnection (OSI) protocols of the International Standards Organization. Because of that, a lot of support for MAP comes from Europe, where OSI standards are in vogue.

There's transmission control protocol/internet protocol (TCP/IP) running on Ethernet, an arrangement many system integrators say is a smart step toward MAP because of TCP/IP's accommodation of OSI.

Moving Toward CIM

IN THE COURSE OF THIS process of development toward computer-integrated manufacturing, a number of the theoretical and practical problems still must be solved. There is a connection between size, necessary volume of information and system stability. Proceeding from the purpose, there will be an optimal range or a compromise solution for every technical system with respect to these three components. If the system size is regarded as given, maximum stability will be achieved when the coupling relations within the system and outward are minimized and the extent of the necessary exchange of information is reduced to a minimum.

The determination of these minimum values constitutes one of the essential problems. Since no algorithms or general principles for the determination of such limits exist, the experience gained from working with such systems has to be used as the basis.

On principle, a multistable system must be generated, consisting of ultrastable subsystems (the system is independently capable of finding a stable state of equilibrium). This is accomplished by the continuous rearrangement of the system structure in response to each disturbing influence (deviation from the desired state), which initiates appropriate counter-reactions.

For computer-guided production systems, this means that a shift of tasks has to be controlled in an operation-connected way. Control systems that are efficient in this respect aim at informational restructuring using the concept of priority-controlled shifting intelligence.

The aim of the concept presented in *Figure 2* is the logical consequence of individual processes of automation in development, planning and manufacture, which are based on the versatile use of computer engineering for the control, coordination and monitoring of manufacture.

As long as no integrating geometry model for the manipulation of geometric data is available, different programs remain separate. For instance, in aircraft construction, extensive CAD systems, such as CADAM for producing drawings, GEOLAN for surface design and NASTRAN for finite element computation, are used at the different stages of development, from project drawing to detailed design, but they remain isolated.

The computerization of planning functions to a higher degree leads to higher stages of integration, with the advantages of faster execution and higher quality of planning, and improved product quality. A more advanced level of automation has been realized with a computer-integrated and automated manufacturing system for machining, which includes automated machining, the making available of material and tools, and all supply and removal operations connected with manufacture, control of manufacture, continuous stock recording and recording of operating data.

Flexible manufacturing systems (FMS) achieve a higher scope of functions and, therefore, a higher level of automation. The aims of FMS are especially automated tool change, the automated intermediate storage and transfer of work pieces and tools, and the computer-aided overall control of information flow and material flow within the system. The principle of the FMS, therefore, consists in the combined action of four flows:

1. The parts flow, carried out by means of transport paths and pallets. Chutes, raceways, air-cushion transport paths, rail-guided transfer robots, and robo-carriers (induction-loop-guided transfer cars) are used as transfer facilities, and pallets may be used for work accommodation in lots (e.g., rotationally symmetrical work pieces) or for work accommodation in pieces (larger prismatic work pieces).
2. The tool flow, mostly within the machining stations (machining centers), automated and strictly organized within the overall system.
3. The information flow, which proceeds in general in the NC operation. One process computer is used to supply the working information, a second for the optimization of occupation (per week or per shift) and the control of the material flow.
4. The energy flow to coordinate the function of all main and accessory drives in the system.

Examples Of Products

MRP IS A PRIME COMPONENT of emerging CIM systems. MRP is a mature technology, proven in thousands of manufacturing environments, with predictable cost benefits and a fairly rapid return on investment.

The Cincom Control: Manufacturing System (an MRP II product) accommodates, in one system, management of discrete, repetitive and project-oriented manufacturing.

The proposed version 3.0 of MAP/TOP (Manufacturing

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Automation Protocol/Technical Office Protocol) has some working prototypes.

Ungermann-Bass Inc., one of the industry's largest networking vendors, announced an upcoming product family and said it plans to migrate to the OSI (Open Systems Interconnect) protocol.

Systems Integration Specialists Co. Inc. (SISCO) debuted a family of MAP products under the F/MAP name. The family includes F/MAP-DMA, a device-management application for MS-DOS personal computers. The program uses the MMS (Manufacturing Message Specification) protocols to control the uploading and downloading of programs for MMS-compatible programmable devices. List price for the program only is $1,995; the source code version lists for $2,995.

SISCO also announced F/MAP-Test, which allows you to test client and server applications, create log files that capture behavior of applications and monitor tests in progress. The program can be used as a low-cost test system for developers and to test specific application software scenarios anticipated by users. List price for the executable version of the program is $7,995; the source code version lists for $8,995.

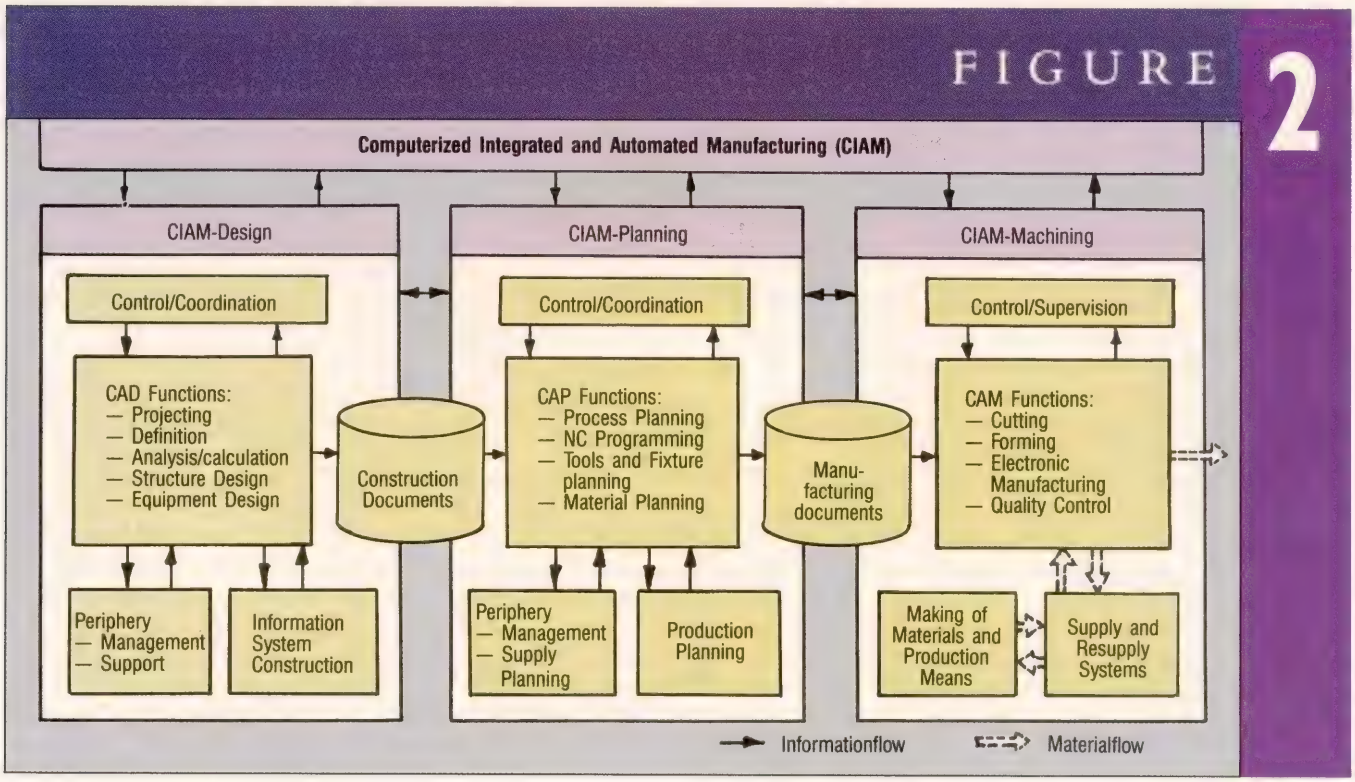
SISCO's MMS-Ease is a C-language library of functions and data instructions that provide applications with an interface to MAP networks.

Retix introduced the Retix PC 300 series of three wide-area network controllers for IBM-class personal computers. The controllers support connection-oriented and connectionless network services. The connectionless support is required for MAP, TOP, Corporation for Open Systems, National Bureau of Standards, and GOSIP (Government Open Systems Interconnection Profile).

Burr-Brown Corp. announced several MAP 3.0 products, including the model FNS802.4-1 Factory Information Network Server, which can use bar-code readers, data-collection terminals and voice input systems. Burr-Brown also introduced the model FNS802.4-2 Data Acquisition Factor Network Server, which can provide transparent access to and control of the company's line of factory data-acquisition devices.

HEWLETT-PACKARD HAS FOUND THE SOLUTION to the problem of access to complex documentation (how is the case with CIM, AI and FMS) by putting all the documentation onto an online source like the HP LaserROM. For example, more than 10,000 pages of HP-UX documentation, including full information on AT&T's UNIX System V Interface Definition, Release 2, the base of HP-UX, are provided in the HP LaserROM service. The information access is designed for users of HP 9000 Series 800 computers, but most of the information provided is applicable to the broader UNIX V.2 marketplace.

FIGURE 2



Components of an integrated and automated production system.

The service will be provided on a CD-ROM that holds up to 600 MB of information. It will consist of HP-UX general users manuals, programmers manuals, data communications manuals, an information management manual, language manuals, migration manuals, native language support manuals, system administrators manuals, a peripheral configuration guide, software status bulletins and a product catalog.

All of this information is a searchable form, with each significant work on the disc indexed. Users can specify selected words, phrases or topics of interest, and the system identifies each occurrence of the specified information. There is a browse feature that lets the user find information by migrating from a general table of contents to a specific section of interest. It also uses HP's NewWave graphical user interface.

The service costs $1,800 for 12 months, and a 5¼-inch CD-ROM drive starter kit is included. The CD-ROM drive interface fits into any AT-bus slot.

To better serve its CIM customers, as well as other customers, Hewlett-Packard opened its World Wide Customer Support Center outside Atlanta. This Center consists of a Response Center and areas for education and product demonstration, as well as HP's only Customer Network Center in North America. (See "Customer Support, Hewlett-Packard Style," *HP Professional*, August 1988.)

HP has new programs for factory automation. One of these is the automatic monitoring for predictive repairs, with which you can make the fix before big repairs are necessary. HP also has created OpenView, a comprehensive network management solution for both wide-area and local-area multivendor networks — very useful in CIM. At the heart of HP's offering is OpenView Windows, the powerful user interface for all integral OpenView applications. OpenView Windows, oriented around graphical network map with shapes and colors, provides pool-down menus and prompted data entry for syntax-free command execution.

HP recognizes that its products must fit into multivendor networking environments. They also must be based on industry standards to provide full value and freedom of choice for customers. In keeping with HP's overall AdvanceNet networking strategy, OpenView conforms to the Open Systems Interconnect (OSI) network management architecture and incorporates links into the SNA environment.

To increase its international CIM involvement, Hewlett-Packard signed an agreement to work together in telecommunications network maintenance with Societa Finanziaria Telefonica SpA. (STET), which is Italy's state-owned telecommunications group. Under the agreement, HP acquired 35 percent of Network Control Systems SpA (NECSY), a Padua-based company controlled by STET. The venture is expected to help HP's business in Italy and other European markets. Europe currently represents 35 percent of HP's total revenue ($8.1 billion in 1987).

HP also plans to rely on NECSY's know-how in manufacturing network measurement gear. NECSY specializes in project planning, production and marketing of test equipment, as well as data communications network measurement and management. NECSY currently supplies HP with maintenance systems that automatically signal equipment breakdowns. The company also is expected to manufacture measurement equipment for telephone network maintenance.

Hewlett-Packard, Big Eight accounting firm Coopers & Lybrand, and manufacturing controls vendor Fisher Controls opened the first of a series of CIM Technology Centers in New Jersey, showcasing CIM technology for process manufacturers such as oil, chemical and pharmaceutical companies. Fisher's system is called Provox. Another CIM technology center in Chicago targets the food and beverage industry and is sponsored by Digital Equipment Corporation.

Artificial intelligence is the most powerful technique used for advanced CIM. For HP users, the AI workstation is currently an HP 9000 Series 300 computer, based on the Motorola MC68000 series microprocessor. The workstation tightly integrates an AI development environment, Common LISP (the de facto LISP standard), PROLOG and object-oriented programming with HP-UX running C, PASCAL and FORTRAN. Prices range from $21,000 for a bundled monochrome system to $30,000 for a high-end color configuration.

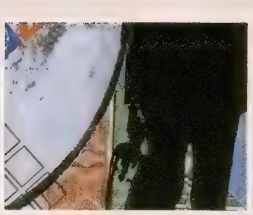
Artificial intelligence requires the integration of purely formal logic with heuristic principles of decision finding. The following are expected to be the essential fields of application in the coming years:

- *Expert systems for solving manufacturing problems*
- *Situation recognition, supervision, diagnostics and the determination of remedial strategies*
- *Vision and manipulation*
- *Optimization of the man-machine interface*

HP computers will play a very important role in all these areas. —*Dr. Michael M. Dediu is president of Dediu Computer Consultants, Tewksbury, MA.*

WHAT IS CASE?

Where Is the Computer-Aided Software Engineering Market Going And What Is HP's Place In It? Part 3



CASE

Peggy King

This year has been proclaimed as the year for integrated, or Full CASE, environments that automate the entire software lifecycle from the requirements and specifications phases through testing and maintenance. While there has yet to be any one vendor with a set of products that covers every lifecycle phase, 1988 has been the year for CASE vendors working together toward Full CASE by offering interfaces to other tools and systems. For example, most of the principal vendors of integrated CASE tools have documentation processing interfaces to documentation preparation systems from vendors such as Interleaf, Scribe or Omnipage.

Quite a number of new CASE vendors and new products from established vendors have been introduced in recent months. In fact, three out of four of the products discussed in this article were introduced for HP workstations in 1988.

The 1988 CASE Consulting Group's *CASE Industry Directory* published in July lists over 100 vendors, but only a small fraction of these vendors have products running on HP 9000 workstations. Most CASE vendors bring out technical CASE products for Apollo, Sun and VAX workstations before coming out with a version for Series 9000 workstations. By next year, look for more CASE vendors to introduce versions of their products that will run on HP 9000 workstations, especially for workstations using HP-UX.

Currently, there are four vendors offering integrated toolsets on HP 9000 workstations. The first CASE toolset for HP workstations was HP's licensed version of Cadre's Teamwork. The other three CASE environments include Software Through Pictures from Interactive Development Environments (IDE) (San Francisco, CA), EPOS from Software Products and Services (SPS) (New York, NY) and PSL/PSA from Meta Systems Ltd. (Ann Arbor, MI).

This article will give brief background information about each company and then examine comparable features of the various front ends of these integrated CASE environments.

Background Information

Cadre Technologies Inc./HP's Logic Systems Division — Cadre Technologies (Providence, RI) was founded in 1984. Hewlett-Packard licensed and began using Teamwork internally even before Cadre Technologies released it commercially in 1985. In January 1986 HP released HP Teamwork/SA, an enhanced version of Teamwork for Series 300 workstations that run HP-UX.

Interactive Development Environments — IDE was founded in 1983 by Tony Wasserman, the current president and a pioneer in the use of engineering workstations for software development. Software Through Pictures was developed as an outgrowth of Dr. Wasserman's User Software Engineering (USE) research on rapid prototying of user interfaces. The first version of these graphical analysis, specification and design tools was demonstrated at a Sun User Group meeting in 1984 and introduced in 1985. Software through Pictures runs on the HP 9000 Series 300 workstations running HP-UX and recently was ported to the Series 800 workstations.

Meta Systems Ltd. — Meta Systems Ltd. (formerly ISDOS Inc.) began commercial operation in 1983 as an outgrowth of the Information Systems Design and Optimization Systems project that began in 1968 at the University of Michigan. Its product, PSL/PSA, was first released in 1975 and is now in its sixth

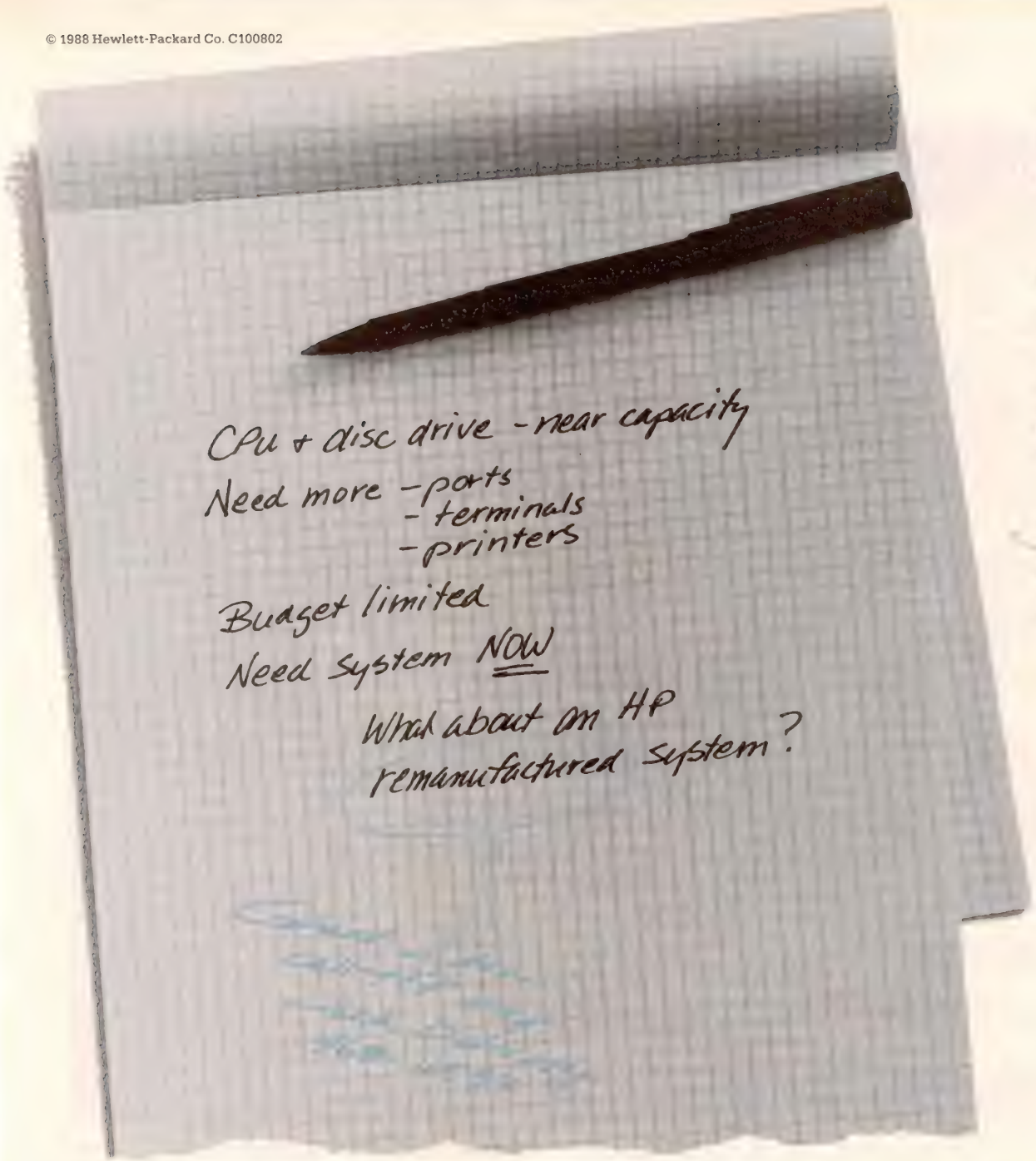


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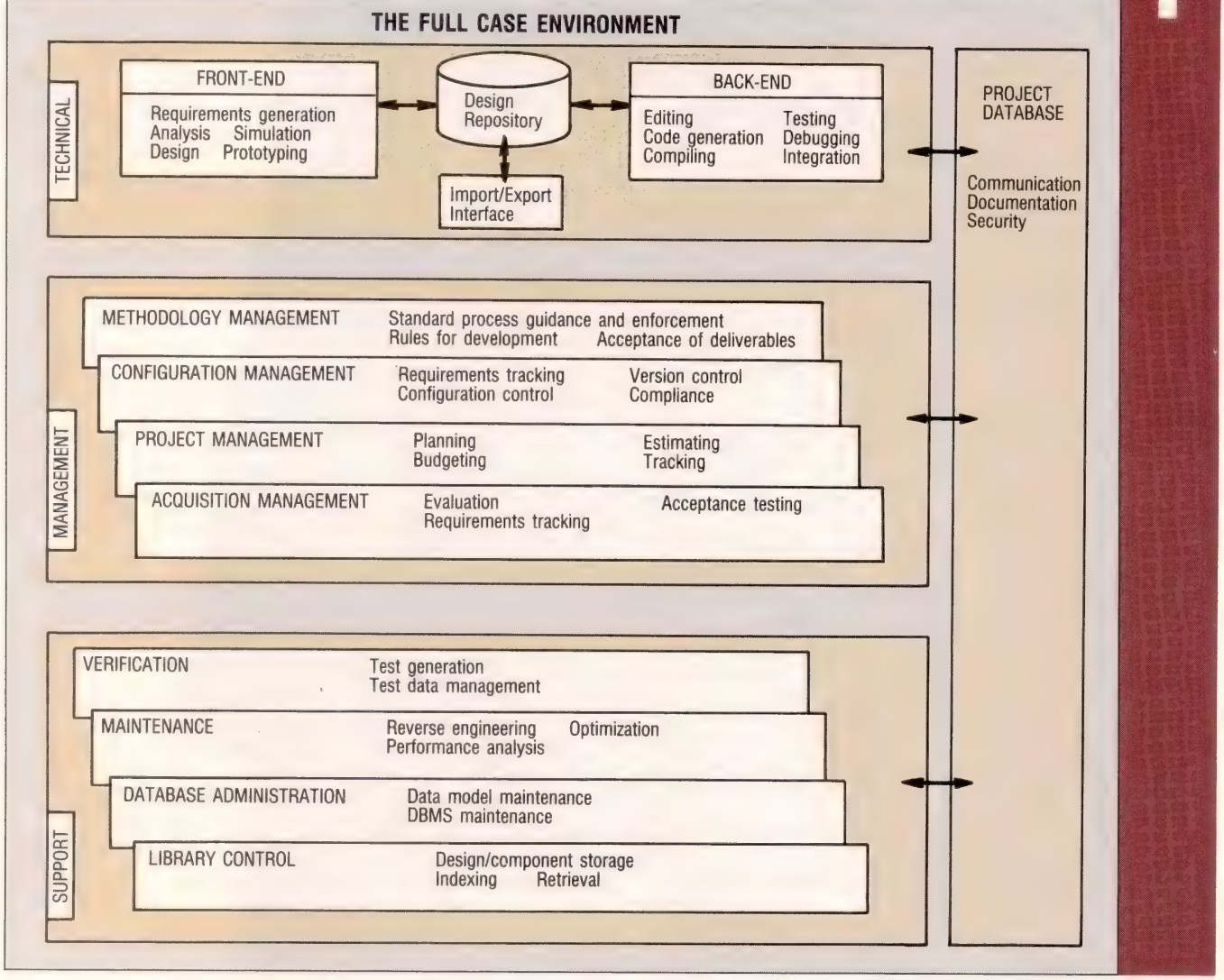
FIGURE



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version. Very recently, PSL/PSA became available for Series 300 and 500 workstations.

Software Products and Services — Software Products and Services (SPS) markets a CASE environment called EPOS (Engineering and Project Management Oriented Support). EPOS was first installed in West Germany in 1981 in a government-sponsored intercompany effort. The first U.S. installation was in 1986. An HP workstation version of EPOS for HP 9000 Series 300 workstations was released in June 1988.

Requirements Generation

Because requirements documents are written in natural language, the requirements phase is the most difficult front-end phase to automate. The tools currently available use specification languages to generate requirements.

In HP Teamwork/SA, the requirements of a system are graphically described from a functional point of view. The Data Flow Diagram editor uses the DeMarco method to partition a graphical diagram and to create a process specification to accompany the graphic representation.

Software Through Pictures has no module that generates requirements specifications, but IDE's open software architecture provides requirements traceability and allows software

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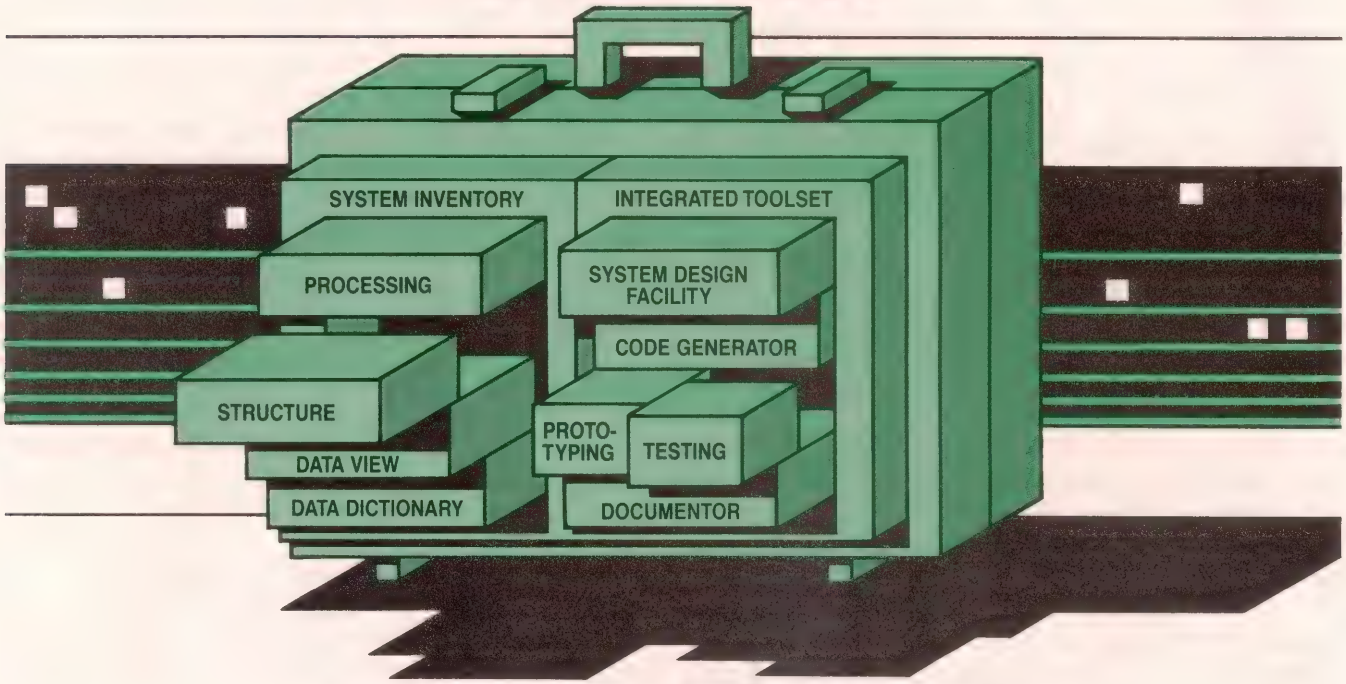

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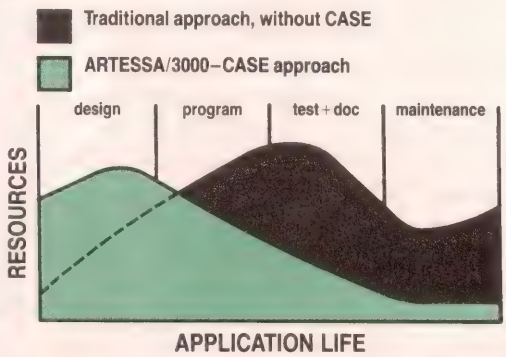

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developers to integrate other tools into the environment.

In the Meta Systems environment, requirement specifications are accomplished with the Problem Statement Language (PSL), a nonprocedural language for describing information processing systems. This approach is independent of structured design methodologies.

EPOS-R is the component for requirements and structured analysis in the EPOS environment. This module relies mostly on text files or graphical input generated outside of EPOS to develop a project dictionary and a requirements document.

Structured Analysis

Structured analysis is the central feature of front-end CASE. CASE tools were developed as a way to automate structured methodologies. Most of the structured analysis tools available on HP workstations can be used with more than one of these methodologies.

HP Teamwork/SA helps users construct data flow diagrams to create a picture of the system they are designing. The editors for data flow diagrams, data dictionaries and process specifications are tightly integrated. The Yourdon/DeMarco approach to structured analysis is supported, and all objects are stored in the project database. HP Teamwork/SA automates the calculation of the Bang Metric, DeMarco's tool for learning about the size and complexity of a proposed system. HP Teamwork/SA also has tools for checking the completeness and balance of data flow diagrams.

The analysis portions of the IDE Tool Environment include three of the five editors used in Software Through Pictures. The Dataflow Diagram Editor supports both the Gane/Sarson and the Yourdon/DeMarco notations. The Structure Chart Editor checks the relationship between modules in the structure chart and the processes in the data flow diagrams. The Entity Relationship Editor uses Michael Jackson's notation for defining data structures.

All of Software Through Pictures' editors have a standard user interface that includes five screen areas, a drawing indicator, a control panel, a symbol indicator, a message area and a command indicator.

In Meta Systems, structured analysis is done on a personal computer rather than a workstation. The Structured Architect product for PCs includes a dataflow diagram editor, an integrated encyclopedia, and various documentation and analysis reports to document the system model. The Vectra is not listed as supported hardware for this product.

EPOS-R automates structured analysis by developing what SPS calls a solution concept. A solution concept is the theoretical layout of a system that is used to divide the project between hardware and software and to subdivide the software requirements into modules. Consistency and completeness checking are available through analysis tools. One unique feature of the SPS environment is that hardware requirements are modeled along with software.

EPOS works independently of languages. Six different design methodologies and a method-neutral approach are supported. It is possible for a user to change methodologies during development.

Provisions For Real-Time Structured Analysis

There are several structured methodologies that provide real-time extensions to the analysis

Structured analysis is the central feature of front-end CASE. CASE tools were developed as a way to automate structured methodologies.

[Some Terms Used In Front-End Case]

Data Dictionary — A collection of the names of all data items used in a software system, together with relevant properties of those items. It also is a set of definitions of data flows, data elements, data stores, files, databases and processes in a data flow diagram, in process specification, or in the data dictionary itself. A data dictionary defines composite data in terms of its components and elementary data in terms of the meaning of each value it can assume.

Data Flow Diagram (DFD) — A graphic representation depicting a network of related functions and the interfaces between components. Data flow diagrams are used to represent the partitioning of a system into a network of activities and their interfaces and to show origins, destinations and stores of data. Data flow diagrams also are known as bubble charts.

Data Structure Diagram (DSD) — A graphic representation used to depict entities, attributes and data relationships required to retrieve data promptly.

Requirements Analysis — A list of the functions that a system must perform and an initial model of the data structures involved.

Structured Analysis — The process of creating a description of a software system through a structured methodology. These methodologies use data flow diagrams, data dictionaries, structured process descriptions in natural languages and data structured diagrams.

Structured Design — A disciplined approach to software design that adheres to a specified set of rules based on principles such as top-down design, stepwise refinement and data flow analysis.

phase of software design. For the real-time environment, CASE tools provide a way to automate the creation of control specifications and state tables.

HP Teamwork/RT extends Teamwork using standard DeMarco data flow diagrams along with vertical bars to represent control flows. These diagrams with control flows are called Control Flow Diagrams (CFDs). The real-time module also supports the Hatley extensions to DeMarco's methods.

HP Teamwork's real-time extensions also include four tools for modeling and describing real-time systems: a State Transition Diagram, State Event Matrix, Decision Table and Process Activation Table.

For event-driven systems, IDE enhances its Structured Analysis module of Software Through Pictures with two additional editors: Control Flow and State Transition. This module, Structured Analysis for Real-Time, also generates Petri-Netts charts used in real-time design language.

Version 6.0 of Meta's PSL/PSA expands the modeling capabilities to include real-time systems design extensions.

Provisions for real-time specification are included in EPOS-S along with the structured design module. The next release of EPOS will include enhancements of this module.

Structured Design

All four CASE environments described here have links between the analysis and design modules. Through a project database, objects created during the analysis phase can be accessed and edited during the design phase.

HP and Cadre's structured design module, HP Teamwork/SD, produces a graphic representation called a Design View. There are consistency and completeness checks for the completed model of the structured design.

In Software Through Pictures, the design-phase editor is called a Structure Chart Editor (SCE). The SCE checks the

relationship between modules in a structure, verifies the correctness of the diagram and performs checking against it.

At Meta Systems Ltd., the methodology underlying the PSL/PSA tool is based on the ability to capture and integrate specification information throughout all phases of systems development. This model, developed by their director of Research and Development, Yuzo Yamamoto, is called Object-Property-Role-Relationship or OPRR.

EPOS-S, the design component of SDS' product, uses organized capture of the system's requirements to enter the information in the EPOS database with either a graphics editor or a keyword structure.

Prototyping

Rapid prototyping is used to refine a system's specification rather than as a way to begin implementation. Therefore, despite the fact that code is generated, prototyping is part of front-end CASE.

HP Teamwork does not include prototyping capabilities. Through use of HP Teamwork/ACCESS, the HP Teamwork database can integrate prototyping tools from other vendors.

RAPID/USE, the first module of Software Through Pictures, is used for rapid prototyping of user interfaces. A sample design for a user interface can be created by someone with little programming experience because the code is generated automatically.

Meta Systems' CASE environment does not include prototyping capabilities.

Because SPS' CASE product can generate code through the EPOS Code Generation Tool System, system designers can do prototyping even before the design phase is complete. Code generation makes it possible to check a portion of a design to see if it meets requirements.

The final article in this series will take a look at the back-end CASE tools provided by the same four vendors. In addition, it will examine the type of project database used for each integrated product and report on the configuration management, project management and document generation tools from other vendors that can be integrated with CASE products on HP 9000 workstations.

Rapid prototyping is used to refine a system's specification rather than as a way to begin implementation.

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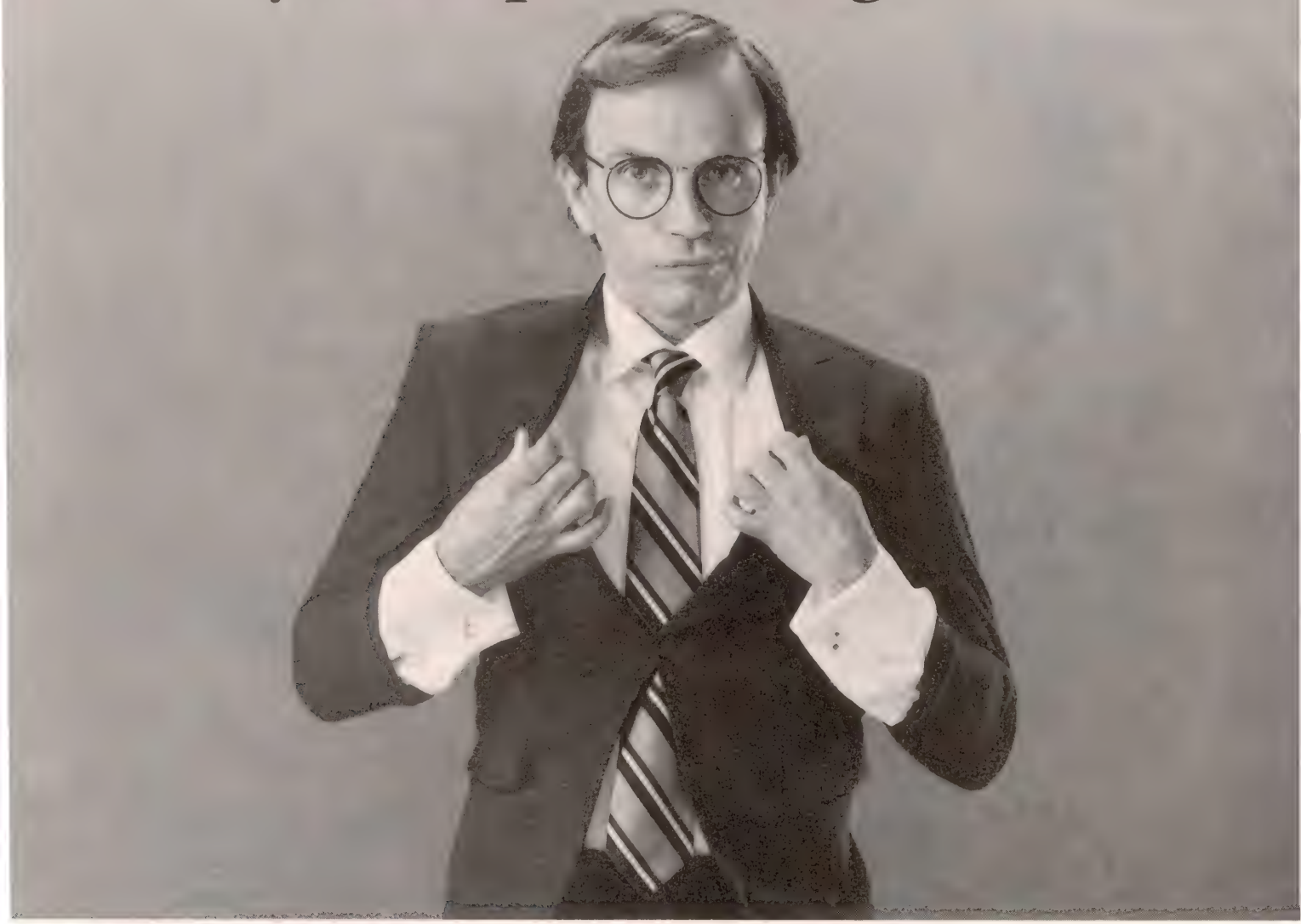

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THE PROMISE OF MPE/XL, PART 2

Exploring MPE/XL's Input Commands, WHILE Loops And Command Files

PROGRAMMING

Eugene Volokh

Editor's Note: Last month, Eugene Volokh introduced us to many of MPE/XL's new features and compared MPE/XL with MPE/V. This month he continues with an introduction to MPE/XL's input and output commands, looping capabilities and command files.

Input And Output

A major shortcoming of MPE/V was the absence of any general output command. To output a simple message, you had to have a UDC like:

```
DISPLAY !STUFF
OPTION LIST
COMMENT !STUFF
```

The OPTION LIST would cause the UDC body — in this case, COMMENT followed by the DISPLAY parameters — to be output. To output any message, you'd say:

```
DISPLAY "HI THERE!"
```

Unfortunately, this would display not HI THERE!, but:

```
COMMENT HI THERE!
```

To avoid the output of the COMMENT, you had to output special escape sequences to backspace the cursor and clear the line. Of course, this wouldn't work on a printing terminal.

MPE/XL does things the right way. It simply has an MPE command to do the job. Just say:

```
ECHO HI THERE!
```

The only thing I can complain about is the command name; ECHO's pretty unintuitive. UNIX, of course, calls its command ECHO (along with calling its PURGE command RM and its text search command GREP), and MPE/XL borrowed the name. I'd rather HP call it DISPLAY or TYPE or OUTPUT or something like that, but it's hardly a big deal.

Outputting variables and expressions can be done easily with the ECHO command. You just use the !xxx and ![xxx] syntaxes:

```
ECHO YOU'RE SIGNED ON AS !HPUSER.
  !HPACCOUNT, X = ![UPS(X)]
```

In addition to the :ECHO command for output, MPE/XL also has an input command, fortunately called :INPUT. For instance, you might have a UDC that says:

```
MOVE FROMFILE, TOFILE
SETJCW CIERROR=0
IF FINFO("!TOFILE",0) THEN
COMMENT Target file already exists!
 INPUT PROMPT="OK to purge !TOFILE? ";
     NAME=PURGEFLAG
IF UPS(STR(PURGEFLAG,1,1))="Y" THEN
  PURGE !TOFILE
ENDIF
ENDIF
RENAME !FROMFILE, !TOFILE
```

If TOFILE already exists, the UDC will ask the user if it's OK to purge it. UPS(STR(PURGEFLAG,1,1)) simply means "the upshifted first character of PURGEFLAG." This way, Y, YES and YOYO all will be accepted as a YES answer.

Actually, there's one pretty big temptation with the :INPUT command that should be

resisted. You should think twice before using the :INPUT command to prompt for UDC (or command file) parameters. For instance, a UDC such as:

```
MOVEP
INPUT PROMPT="From file? "; NAME=FROMFILE
INPUT PROMPT="To file? "; NAME=TOFILE
SETJCW CIERROR=0
IF FINFO("!TOFILE",0) THEN
  COMMENT Target file already exists!
  INPUT PROMPT="OK to purge !TOFILE? ";
      NAME=PURGEFLAG
  IF UPS(STR(PURGEFLAG,1,1))="Y" THEN
    PURGE !TOFILE
  ENDIF
ENDIF
RENAME !FROMFILE, !TOFILE
```

may not be a very good idea at all. Unlike the parameterized UDC we showed above, this one can be used conveniently only directly from the CI (command interpreter).

Let's say you want to write another UDC that runs a program and renames one of its output files (LISTFILE) into LISTFILE.ARCHIVE. With the parameterized MOVE UDC, we could say:

```
...
RUN MYPROG
MOVE LISTFILE, LISTFILE.ARCHIVE
...
```

and then have the MOVE UDC prompt the user if LISTFILE.ARCHIVE already exists. The unparameterized MOVEP UDC can't be used here at all, since it always prompts the user for the input and output files, which in this case are fixed and should not be prompted for.

In other words, this is the same reason why the best third-generation language procedures take their input values as parameters rather than prompt for them. A parameterized procedure is much more reusable than a prompting procedure.

One very interesting use of the :INPUT command might be in cases such as this:

```
MOVE FROMFILE=" ", TOFILE=" "
IF "!FROMFILE"=" " THEN
  INPUT PROMPT="From file? "; NAME=VARFROMFILE
```

```
ELSE
  SETVAR VARFROMFILE "!FROMFILE"
ENDIF
IF "!TOFILE" = " " THEN
  INPUT PROMPT="To file? "; NAME=VARTOFILE
ELSE
  SETVAR VARTOFILE "!TOFILE"
ENDIF
SETJCW CIERROR=0
IF FINFO("!VARTOFILE",0) THEN
  COMMENT Target file already exists!
  INPUT PROMPT="OK to purge !VARTOFILE? ";
    NAME=PURGEFLAG
  IF UPS(STR(PURGEFLAG,1,1))="Y" THEN
    PURGE !VARTOFILE
  ENDIF
ENDIF
RENAME !VARFROMFILE, !VARTOFILE
```

This UDC can accept its input either from its parameters or from the terminal. If it's used from within another UDC or by a knowledgeable user, it can be passed parameters. If a novice user is using it, he can just type :MOVE and be prompted for all the input. This is helpful if, for instance, the user is unfamiliar with what parameters the UDC takes. Actually, this may not be so useful for a simple UDC like this, but a really complicated UDC with many parameters can be made much more convenient using this type of "dual-mode" processing.

There are plenty of other uses for the :INPUT command — menus, error processing, "Abort UDC or continue?" etc. There also are a lot of rather devious, non-obvious uses for it (more about those later). The only thing that bears keeping in mind is that :INPUTs should not take the place entirely of parameter passing.

:WHILE Loops

No programming language is really complete without some sort of looping capability. In MPE/V, you sometimes could make do with the pseudo-looping capabilities of EDITOR/3000 (for things like taking the output of one program and translating it into input for another) and the ability of :STREAMs to stream other jobs.

One method that we at VESOFT used to make multiple production tapes was a tape-making job stream that at the end streamed itself, thus forming a sort of "infinite loop." This, however, was before we implemented :WHILE and other MPE/XL functions in our STREAMX Version 2.0, which makes things much easier.

In one respect, MPE/XL's :WHILE command gives you all the looping that you need. Any loop, including the FOR x:=y TO z and the REPEAT ... UNTIL constructs, can be emulated with a :WHILE command; however, as we'll discuss later, MPE/XL's looping capabilities fall tantalizingly short in some areas.

First, the good news:

```
SETVAR JOBNUM 138
WHILE JOBNUM<=174 DO
  ABORTJOB #J!JOBNUM
  SETVAR JOBNUM JOBNUM+1
ENDWHILE
```

This is an example of how the :WHILE loop can iterate through a set of integers. This simply aborts a whole range of jobs, from #J138 to #J174. Seems useless? Try submitting 50 jobs in one shot — all of them with the same silly error! I did this the day before I wrote this paper; the :WHILE loop sure came in handy.

Similar things can be done in some other cases; for instance, you can use this :WHILE loop feature to purge LOG## ##.PUB.SYS system log files *if* you know the starting and ending log file numbers (unless you're willing to start at LOG0001 and work your way up).

Here's another example taken roughly from Jeff Vance and John Korondy's excellent paper, "Design Features Of The MPE/XL User Interface" (Interex Las Vegas 1987 Proceedings):

```
PRT F1, F2=" ", F3=" ", F4=" ", F5=" ", F6=" "
COMMENT Prints F1, F2, F3, F4, F5, and F6 to the line printer
FILE OUT;DEV=LP
SETVAR I 1
SETVAR F7 " "  < < to terminate the loop > >
WHILE "!"F!I"" < > " "
  IF FINFO("!"F!I"",0) THEN
    ECHO PRINTING !"F!I"
    PRINT !"F!I";*OUT
  ELSE
    ECHO ERROR: !F"!I" NOT FOUND, SKIPPED.
  ENDIF
  SETVAR I I+1
ENDWHILE
```

The WHILE loop iterates through the six UDC parameters. The construct !"F!I" actually is rather interesting. If I is 3, it gets translated into !"F3", which in turn gets replaced by the value of the F3 parameter.

Another example might be checking a parameter to make sure that it's, say, entirely alphabetic. This might be necessary when passing it to some program that will abort if there are any non-alphabetic characters in it.

```
SETVAR I 1
WHILE I<=LEN(PARM) AND UPS(STR(PARM,I,1))>="A" AND &
                       UPS(STR(PARM,I,1))<="Z" DO
```

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CIRCLE 129 ON READER CARD

```
  SETVAR I I+1
ENDWHILE
IF I>LEN(PARM) THEN
  COMMENT Hit the end of the string
    without finding a non-alpha
  RUN MYPROG;INFO="!PARM"
ELSE
  ECHO Error! Non-alphabetic character found:
  CALC "!PARM"
  SETVAR BLANKS " "
  SETVAR J 1
  WHILE J<I
    SETVAR BLANKS BLANKS+" "
    SETVAR J   J+1
  ENDWHILE
  CALC BLANKS+"^"
ENDIF
```

Note the little bells-and-whistles. If there's a non-alphabetic character, we use a :WHILE loop to concatenate several blanks and use a caret symbol (^) to flag the non-alphabetic symbol. So, the output looks like:

```
Error! Non-alphabetic character found:
FOOBAR.XYZZY
          ^
```

Many parsing operations actually can be done more simply with the POS function, which finds the first occurrence of one string in another; however, some complicated operations, such as the ones I just showed, may require :WHILE loops.

Finally, one other place where :WHILE should find a lot of use is with the :INPUT command:

```
INPUT PROMPT="OK TO PROCEED (Y/N)? "; NAME=ANSWER
WHILE UPS(ANSWER)<>"Y" AND
    UPS(ANSWER)<>"YES" AND &
    UPS(ANSWER)<>"N" AND UPS(ANSWER)<>"NO" DO
  ECHO ERROR: EXPECTED YES OR NO.
  INPUT PROMPT="OK TO PROCEED (Y/N)? "; NAME=ANSWER
ENDWHILE
```

Most good UDCs and command files that use :INPUT should have some sort of input error checking, and this kind of :WHILE loop is a convenient way of doing it. Of course, you could get rid of the four UPS(ANSWER)s by doing a "SETVAR ANSWER UPS(ANSWER)", but you'd have to do it after each input command.

With all this power, what's there to complain about? After all, with an :IF and a :WHILE any language is theoretically complete — any algorithm can be implemented. Well, not quite. Control structures can get you only as far as the data access primitives are able to take you. Take some of the iterative operations that you'd *really* want to implement:

Control structures can get you only as far as the data access primitives are able to take you.

- *WHILE there are files in a fileset, DO something to them.*
- *WHILE there are jobs left, ABORT them (in preparation for a backup).*
- *WHILE there are records in a fileset, DO some processing on them. You could perhaps write some of the records into another file, or pass them as input to some other program.*

You can't do any of this (straightforwardly) because MPE/XL doesn't give you any functions to read files, to handle filesets, to find all jobs, etc. You'd like to be able to say:

```
:WHILE FRECORD('MYFILE',RECNUM)<>"
...
:ENDWHILE
```

where FRECORD would return a particular record of the specified file. Unfortunately, no FRECORD primitive exists. The :WHILE command is only as powerful as the conditions you can specify. Unfortunately, at the moment, this mostly seems limited to numeric iteration and to checking command success/failure.

Another thing you'd like to be able to do with :WHILE is to repeat a particular command every given number of seconds or minutes; for instance, to have a job stream wait until a particular file is built or becomes accessible. Unless you're willing to spend lots of CPU time in the loop, you need to have some way of pausing for a given amount of time. For example:

```
:WHILE NOT FINFO('MYFILE',0) DO
: PAUSE 600 << 600 seconds >>
:ENDWHILE
```

Unfortunately, as of MPE/XL Release 1.1, there is no :PAUSE command or PAUSE function provided by MPE/XL (although as we'll see later, there are some tricks you could do).

Command Files

Command files were implemented more for convenience than for additional power; however, they can be convenient indeed.

Simply put, a command file is a replacement for a UDC. If you want to implement a new command called DBSC to run DBSCHEMA, you used to have to write a UDC:

```
DBSC TEXT="$STDIN", LIST="$STDLIST"
FILE DBSTEXT=!TEXT
FILE DBLIST=!LIST
RUN DBSCHEMA.PUB.SYS;PARM=3
```

You'd add this UDC to your system UDC file, :SETCATALOG the file and presto, you have a new command.

In MPE/XL, you can use a command file to do the same thing. You can build a file called DBSC.PUB.SYS that contains the text:

```
PARM TEXT="$STDIN", LIST="$STDLIST"
FILE DBSTEXT=!TEXT
FILE DBLIST=!LIST
RUN DBSCHEMA.PUB.SYS;PARM=3
```

Note that the word "DBSC" in the first line of the UDC was replaced by the word "PARM" in the command file. The very presence of the DBSC.PUB.SYS file will implement the new command; there is no need to :SETCATALOG it. You can enter:

```
DBSC MYSCHEMA, *LP
```

and MPE will check to see if DBSC.PUB.SYS exists, find that it does and execute it much like it would have a :SETCATALOGed UDC.

Why is this so nice? Well, remember all the nonsense you had to go through to change a :SETCATALOGed UDC file? You had to build a new file with a different name, :SETCATALOG it in the old one's place, and even then it wouldn't take effect for another session until it logged off and logged back on! Most people ended up having several versions of the system UDC file, since you couldn't purge the old file until everybody who had been using it was logged off.

With command files, simply build the file. There is no need to worry about whether the UDC file is in use (unless the command is being executed at that very moment, it won't be in use). There also is no need to choose a new name for the file, and no need to remember to respecify all the other

UDC files on the :SETCATALOG.

In fact, the MPE/XL compiler commands actually are implemented this way. For instance, :PASXL is just a command file (PASXL.PUB.SYS) that sets up several file equations and runs PASCALXL.PUB.SYS (the actual compiler program file — you still need programs for something).

Chances are good that any example in this paper that involves UDCs will work with command files, too. Actually, you'd probably want to use command files with all these examples. I only use UDCs in the examples to keep things as familiar as possible.

You can implement account-wide commands by putting the command files into your PUB group. You also can implement group-wide commands by putting them into your own groups. As we mentioned earlier, MPE/XL has a special variable called HPPATH that indicates where it is to search for command files; by default, HPPATH is set to "!HPGROUP,PUB,PUB.SYS"; i.e., "search your group (!HPGROUP) first, then the PUB group, then the PUB.SYS group." You actually could change it to something else. For example:

```
:SETVAR HPPATH "!HPGROUP,PUB,PUB.VESOFT,
  CMD.UTIL,PUB.SYS"
```

In fact, it's probably a good idea to keep your own command files not in PUB.SYS (where they'll just get lost among all the other files), but in a special group, say CMD.UTIL. This way, a simple:

```
:LISTF @.CMD.UTIL
```

will show you all the system-wide command files that you've set up. Of course, you'll have to have a system-wide logon UDC that sets up the HPPATH variable to include CMD.UTIL.

A similar feature of MPE/XL is "implied run." Just entering a program file name *automatically* will cause that program to be run. For example, :DBUTIL automatically will do a:

```
:RUN DBUTIL.PUB.SYS
```

without your having to have a UDC or a command file for this purpose.

You also can specify a parameter, which gets passed as the ;INFO= string to the program being run:

```
:MYPROG FOO
:PROG2 "TESTING ONE TWO THREE"
```

and also a second parameter, which gets passed as the ;PARM=:

```
:MYPROG ,10
:MYPROG FOOBAR,5
```

Note that other parameters — ;LIB=, ;STDIN=, ;STDLIST=, etc. — can not be passed; you have to do a real :RUN for that. Also note that MPE/XL looks for the program file in exactly the same places in which it looks for a command file. This includes all those groups listed in the HPPATH variable.

These features all are very convenient and can save you a good deal of effort and some typing. There is, however, one problem with both command files and implied :RUNs (and also UDCs) that limits their usefulness: There's no way for passing the entire remainder of the command line to either a command file, an implied :RUN or a UDC.

For example, let's say I want to implement a new command called :CHGUSER that executes my own CHGUSER.PUB.SYS command file. I want it to look much like MPE's :NEWUSER and :ALTUSER. I'd like to let people say:

```
:CHGUSER XYZZY;CAP=-BA,+DS,+PM;PASS=$RANDOM
```

The CHGUSER.PUB.SYS command file then could take the entire remainder of the line as a single parameter and then perhaps pass it to a program that would process it.

Unfortunately, this simply can't be done. Since the parameter list includes ";"s, ","s, and "="s, MPE/XL views them as delimiters (it would view blanks as delimiters, too). There's no way of specifying in the command file that delimiter checking is to be turned OFF, and that the entire remainder of the command is to be passed as one parameter. If you're thinking that declaring CAP=, PASS=, etc. as keywords to the command file will work, it won't. Look at the ","s in the CAP= parameter.

In fact, MPE's own :FCOPY command couldn't be implemented as an auto-RUN or as a command file. Each :FCOPY command always includes delimiters, and that won't work. I can see why HP doesn't like delimiters in an implied :RUN (so the ;PARM= value can be specified as well as the ;INFO=), but why not have some sort of option for command files? I'd rather be able to pass the entire remainder of the command as one parameter than be able to specify a ;PARM= value.

In fact, UNIX does have a way of treating the parameter list (of either a program or a command file) as either a sequence of individual parameters or as one single string; UNIX programmers frequently use this feature. Again, this may be looking a gift horse in the mouth, but it would have been so easy for HP to implement something like this.

In Part 3, we'll take a look at some tricky things you can do with MPE/XL. — *Eugene Volokh is vice president of research and development at Vesoft, Los Angeles, CA.*

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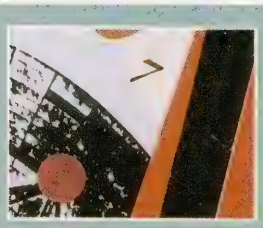
CIRCLE 131 ON READER CARD



DEVELOPMENT

Lisa Burns Hartman

Reach Out And Touch Someone

Recently, the scope of the software project I manage expanded. In the past, we had provided sales order-processing software to Hewlett-Packard sales offices within the U.S. The expansion of the project meant that our new software would run in sites all over the world. We were faced with the challenge of meeting user needs for sales office personnel in Hong Kong, Australia, Los Angeles, Geneva, Frankfurt, Paris and other sites without the travel budget to visit those sites in person. How would we ensure that the new, expanded system would meet business needs worldwide?

If you read "Quick Prototyping On The HP 3000" (*HP Professional*, October 1987), you may be familiar with the technique of using V/PLUS's FORMSPEC and ENTRY subsystems to create believable, interactive prototypes of new online systems. The article, however, describes how to conduct these sessions face to face with your users. What if those users are halfway around the world, in Singapore, for example? Unless your travel budget is a lot better than mine, it will be hard to have face-to-face sessions with those users. Even if you have the travel budget, trips to distant sites can be extremely time consuming and can slow down your project. We even had difficulty traveling to several sites in the U.S. with a new design.

In order to avoid extensive travel for designing new features while ensuring that user input and needs are addressed, we came up with the idea of doing telephone conference sessions. We call the technique "remote prototyping." Remote prototyping works the same way as face-to-face prototyping, but requires a bit more planning and set-up.

In this article, I'll describe how to set up and conduct these sessions, and I'll share our experiences in using this technique for online system design.

The Necessary Hardware

In order to conduct a successful prototyping session with users in another location, you need to ensure that the hardware you'll need is in place. First, you'll need a voice connection so you can conduct the telephone conference portion of the session. A video conference set-up would be fantastic, so if you have one, use it, but this is not necessary. We have found that a four- or six-way phone call works well. Speaker phones also are an option. They work best in a conference room so that workers in areas around the phone are not disturbed. Check into the possibilities at your site and at the user site.

The next hardware requirement is terminals. Just as for an in-person session, it's best to have one terminal for every two to three users at the user site. You'll need terminals at your site, too, so you can follow along with your prototype script. The terminals should be the same model as those that will be used in production for your system.

Once you've set up terminals at both your site and the user site, you need to establish access to an HP 3000 from those terminals. Your users can log onto your development machine and access the forms file and ENTRY there. This will ensure that they are accessing the correct software, but will leave you open to data communications-line problems or LAN problems. If the line drops, that will be the end of your session!

Another method is to send them a tape with the forms file on it. The users could load this onto their computer and run ENTRY locally.

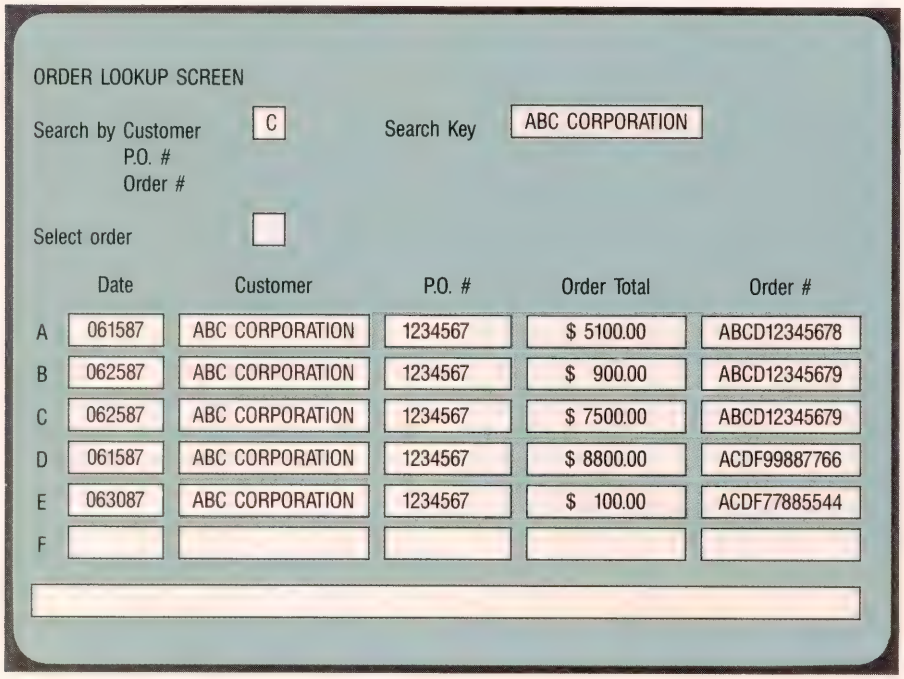
Preparing The Screens, Script And Follow-up Questions

Now that you have the hardware in place, it's time to prepare the software. Just as for an in-person session, you will need to prepare a sequence of screens and a script. The details of how to do this are in the October 1987 article.

In addition to the script, however, you may want to prepare a list of questions to ask users regarding the screens. This is especially important if several sessions are being conducted, because you probably will want to remember to ask all questions of all users. A sample screen and associated questions are shown in *Screen 1*.

Once you have all of the components of the session in place, it's time to schedule the session with your users. Choose a time when the participants can set aside an hour or more of uninterrupted time. Be sure to take into account time-zone differences! Also, plan the session far enough ahead of time that users who need to come to one central site can make travel arrangements. For example, you might hold one session at a central Los Angeles office and invite users from other offices in San Diego and Santa Barbara. This still will involve some travel.

When you've scheduled the actual prototype session, schedule a test session one or two days ahead of time so you can check out your connections. Does the phone line work? Are the speaker phones in place? Are the terminals in place? Have the datacomm connections been set up? Has the forms file been received and installed at the



user site? These are things you will want to check out before you have 10 users in a room waiting for the session to start. Run through the prototype screen sequence briefly with the technical staff in the remote user office to ensure that everything is OK.

Remember the first law of prototypes: Demo sessions never work on the first try.

Conducting The Session

Now it's time to conduct the session itself. This will take the same format as an in-person session, but you will need to take a few extra steps, since you will be conducting a telephone conference rather than one in person:

- *Have each person identify him/herself at the start of the session. This will allow the users to identify everyone at your end by voice and will allow you to identify them by voice. This way, you will know who had which concern as you ask for input.*
- *Immediately identify backup plans if the phone line or terminal lines drop. Should the users call you? What number should they call? Will you call them back to re-establish the conference call? If the terminal lines drop, let them know how to re-establish the connection.*
- *Establish an agenda and rules for the session. Explain the order in which you will be displaying new screens and when you will be asking for their opinion. You may want to establish one spokesperson at each end. The spokesperson at your end will explain the demo and ask for input, and the spokesperson at their end will voice concerns from all of the users involved.*
- *Tell the users up front how you will respond to their concerns. If you are conducting more than one session, you may need to consult with other user sites before you can make a change to the design of the system. In this case they need to know that other users' input must be considered as well.*

Once you have established the ground rules, go ahead and conduct the session just as you would in person. Walk the users through the demo using your script, and ask the questions that you have planned in advance. We have found that having two people on our end of the session works well, so one person can act as a scribe to note user comments, and the other can concentrate on conducting the session.

At the end of the session, thank the participants and explain how you will follow up on their concerns. You may

[QUESTIONS TO ASK DURING THE PROTOTYPING SESSION]

1. Are you happy with the field enhancements? Is the screen easy to read? Would underlining the fields be better than using half-inverse?
2. Are you happy with the field placement? Should any fields be rearranged? Will tabbing be convenient?
3. Are the field labels clear? Are the field lengths adequate? For example, does the order total field allow for enough digits? Will order totals be larger than this?
4. Do you like the fact that the orders are sorted by PO #? Would another sort be better?
5. If the lookup key used is order number, should the sort be different? Would a sort by order date be better? What about a sort by order number? Which sort would be more useful to you in doing your job?
6. Would a lookup by date be helpful?
7. Are six orders enough to display? Would seven or eight orders be better?
8. Is the selection function clear and self-explanatory?

wish to publish a document stating user concerns and explaining how they will be addressed, or to have a second prototyping session with revised screens.

No matter what follow-up technique you use, be sure to let the users know that you heard and understood their concerns. We have done this by listing all suggestions in a document and responding to each. Also, let them know why you made the final decisions you did. This may involve explaining the tradeoffs involved in the decision.

For example, some users may want the capability to do keyed retrieval on a seldom-used field. You may need to explain that adding this key to your database design had an associated performance cost due to the automatic master update, and that because the majority of users did not need this feature, it has not been included.

You also may find cases in which there was no consensus reached among users. In these cases, you should explain that since there was no agreement, you had to make a fairly arbitrary decision. We have found that leveling with our users works best!

Our experience with the remote prototyping sessions has been very positive. For our work on the U.S. system, we have used the technique successfully for several different projects over the past year or so. Users have been very happy with the resulting software. Now that we have begun work on the international project, we have conducted four of these sessions within the U.S. and 11 abroad. Users have responded enthusiastically and have been thrilled to be involved in the design of the system. We anticipate that writing the external specifications will be very easy and that users will be satisfied with the new software.

During our prototyping marathon, however, we have learned the hard way what works well and what does not. Here are some tips for conducting remote prototyping sessions in your shop:

- *Test your set-up. This is the most important tip of all. Nothing is more embarrassing than assembling a dozen people at the other end of a phone line, only to have the forms file be absent, or to have the computer line drop. Conducting the test session ahead of time will ensure that this does not occur. Having a fall-back plan for handling data and phone line drops also will help. Sometimes, however, a session will have to be rescheduled due to technical problems. Allow for this in your design schedule.*
- *Communicate between two physical sites only. Conducting a conversation between two people on your end and five users at the other end is complicated enough. Involving two or more physical user sites will make it really confusing! If necessary, have your users travel to a central site, or conduct multiple sessions.*
- *Avoid having users review material before the session. The prototype session is an interactive process and it requires your script and verbal explanation to work well. Users reviewing paper copies of your screens or reviewing the forms file online prior to the session may form incorrect ideas about the way the screens function, and they may not listen to your explanation.*
- *Be aware of language and style differences between countries. When conducting sessions with users in other countries, be careful to avoid slang. Clear, simple English works best here. Also, users in some countries in Asia may be uncomfortable giving immediate feedback on design decisions. For these countries, the session may consist of explaining the screens and listing questions for them to respond to via memo at a later time.*
- *Resist the urge to lead the users to a predefined conclusion. This is perhaps the hardest thing to avoid in structuring your questions and conducting the session. Remember, if you already had made up your mind, you would not be asking for input! Rather than trying to force a decision, make the users aware of the tradeoffs involved in design decisions. If providing a capability will adversely affect online response time, let them know the cost and make their own decision. It may be that that capability is vital to the way they do business.*

Designers of distributed systems with users in a number of geographically separated sites have a tremendous challenge. Users in Topeka don't always agree with users in Philadelphia. Remote prototyping is a tool that can help meet this challenge. By letting users in different sites see and touch a prototype of a new system, designers can ensure that the product they'll deliver is the product that those users want. Time invested in remote prototyping sessions early in the system design process can save months of rework later. And that can only make Topeka, Philadelphia and Amsterdam much happier! *—Lisa Burns Hartman manages an internal business software programming team at Hewlett-Packard corporate headquarters, Palo Alto, CA.*

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Laptops And Portables

Several mid-range portables are available that fill all of a writer's needs and a few high-end products go far beyond.

Writers and journalists were among the first professionals to adopt laptop and portable computers. Today they have been joined by countless others who need to compute away from their desks.

To lure new purchasers to the laptop market, vendors have introduced a dazzling array of products. The current systems, like the very first machines, still appeal to writers, but now have added appeal to business people and especially to desktop publishers, an occupation that did not exist when Epson released the first notebook computer, the HX-20, back in 1982.

Hewlett-Packard was one of the first major American vendors to produce a top-quality laptop, the HP Portable, later enhanced to become the Portable Plus. Not only was this machine lightweight (7.5 pounds) and nearly indestructible, it still ranks as one of the best designed portables. In an era when the multitude of laptops offered tiny screens and simplistic editing programs, the HP Portable ran DOS, Lotus 1-2-3 and Microsoft Word from ROM.

Somewhere along the line, HP strolled off in a direction different from the rest of the industry and produced the Portable Vectra. Only sort of portable, it isn't a laptop and it doesn't do what writers and desktop publishers need most in a portable DOS machine. To fill this gap, Hewlett-Packard recently contracted with Zenith to OEM one of its top-of-the-line laptop computers — the SupersPort 286. The remainder of this column will assess how writers and desktop publishing groups use portables and how the proposed HP-Zenith product should address those needs.

Three Types Of Portables

Three types of portables are available to fill the needs of writers and publishers, depending on their work habits and overall environment: ultra-portables for note-taking on the run; lightweight mid-range machines that offer battery-powered DOS compatibility; and performance powerhouses that rival the desktops.

Ultra-portables, like the Radio Shack Model 102, are fabulous as note takers. They go where the work is and don't compete for desk space with the computer or mainframe terminal application that is being documented. News reporters and fact gatherers probably are still the biggest market within publishing for these tiny machines. Unobtrusive, they are helpful in interviews and don't call a lot of attention to the writer who needs to interact with people.

The problem with the tiny machines is that decent word-processing software may not be available, and they generally are too small for serious writing. It's difficult to write and edit if you can't see at least a paragraph of text on the screen. Thus, they quickly must upload to a larger system — a desktop Vectra or Macintosh, for example — or to a service such as CompuServe or MCI Mail, so the information may be picked up and used by others.

Several mid-range portables are available that fill all of a writer's needs and a few high-end products go far beyond. One of the finest mid-range laptops and the spiritual heir of the HP Portable Plus is the Toshiba T1000. Small, only 6.25 pounds, and with a good battery, it's a real DOS machine that can run Microsoft Word and other full-function word processors. The DOS is provided in ROM and an option board supplements the computer's single 720-KB 3.5-inch floppy with 384K of electronic RAM. The biggest pain is the small screen's squashed aspect ratio.

The next step up, the Toshiba 1200H, has a larger screen, hard disc and weighs a modest 10.9 pounds. This leads us into the high middle range of laptop portables: the true desktop work-alikes.

In this arena, the HP Portable Vectra is bigger, slower and heavier than comparable machines from GRID, Toshiba, Zenith and NEC. These battery-powered laptops may have a backlit screen and support two 720-KB

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floppies or a 20-MB hard disc. They are real writers' machines. The systems with two floppies usually can run the major word processors, but the hard disc models are a safer bet if the computer is the last step in the production cycle.

Why? Because floppies aren't big enough to support large dictionaries required by spelling checkers and thesauruses. Battery power enables these machines to be always at hand for writing when time is available. Able to control an HP LaserJet Family printer directly from a serial or parallel port, they can produce final copy for most written documents.

HP has elected to OEM and repackage a machine that's one step beyond these functional laptops. The Zenith SupersPort 286 includes all the features offered by the mid-range leaders and adds a 12-MHz 80286 processor and heftier discs. The 3.5-inch floppies store 1.44 MB and offer 720-KB compatibility. Both 20-MB and 40-MB hard disc models will be available.

Beginning with the doubly articulated clamshell case, the machine appears ergonomically sound and aesthetically pleasing. Weighing in at 14.5 pounds, the system is a good deal heavier than the typical lightweight laptop, but includes a 3-4 hour Ni Cad battery pack and Zenith's impressive ice-blue-on-white backlit LCD display.

The comparable competitive system, The Toshiba T3100, is not battery-powered and only supports the orange gas-plasma screen that some folks don't care for. Hewlett-Packard plans to retain the mechanical form factor and interface structure while repackaging the SupersPort 286 as an HP product. The case will be molded in HP standard colors and bear HP's logo and an unspecified model number.

It will be packaged with PAM and the same terminal emulator and disc-caching packages as the current line of Vectras. Since the SupersPort 286 lacks an HP-IL interface, it will not support the HP-IL mouse. Users can add the serial mouse of their choice.

Other accessory plans, such as a

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Compaq Computer Corp.
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modem, aren't finalized by HP, but the company plans to make the new portable an integral part of its current market offerings. Unfortunately, those of us used to superb HP product design will find the portable a little clunky in the way it uses batteries.

The removable battery pack attaches to the back of the laptop blocking access to the interface ports unless the protective flap is lowered. This is not the optimal configuration for carrying. You can carry multiple battery packs, but the appeal of a portable drops off as total weight increases.

The SupersPort 286 includes 1 MB of RAM and can be upgraded with an option card to 2 MB. This additional memory can be used as AT-type extended memory or LIM 3.2-format expanded memory. While HP plans to offer its version of OS/2, it is doubtful if the laptop will support NewWave, which requires more than 2 MB. It's pretty clear a machine of this type is capable of supporting the writing and editing of large documents.

THE NEXT LOGICAL QUESTION is whether a portable is suitable for layout and design. Certainly the SupersPort 286 is capable of running Ventura Publisher and PageMaker. The 12 MHz operation and hard disc performance will hide nicely the overhead of the GEM and Microsoft Windows operating systems the packages respectively require. The hard disc is big enough to hold the large image files that normally are generated during desktop publishing projects.

The question is really, can desktop publishing be done on a laptop? The answer is yes, with some reservations. First, there are problems in doing page layout on a gas plasma or LCD display. Neither of these display technologies offers the contrast possible on a CRT. Unfortunately, the higher resolution in text mode (640 X 400 pixels) provided by double scanning on the SupersPort's supertwist backlit LCD is lost in the graphics mode used by the layout programs.

On the SupersPort, color is mapped into eight "grey" levels, which may be acceptable for Ventura Publisher, which comes up in a black and white Macintosh-like interface on a normal CGA or EGA, but the extra readability for PageMaker provided by Window's use of color is lost.

The traveling publisher can borrow a locally available monitor to alleviate the visibility problem, but anything less than an EGA is blurry. Portable layout also makes an extra demand of the user: The layout and drawing programs all require a mouse, which the user must remember to pack.

A greater difficulty of portable publishing is related to fonts. The complex interrelationship among a document, the fonts specified for it and the laser printer it will be printed on make the traveling desktop publisher's life quite difficult. If the portable computer ordinarily is used with a certain printer, which has available a certain number of fonts, then either the user must find another printer at his new location with the same number and kind of fonts, or he must keep a library of downloadable fonts with or on the computer — either of which could become quite an annoyance.

The highest performance portables, such as the Compaq Portable 386, Toshiba T5100 and Zenith TurbosPort 386 pack power that the portable publisher can't tap. Computationally capable of handling giant layout jobs that require a 19-inch high-resolution monitor, their support environment isn't portable!

The impending HP/Zenith product has the packaging, capacity and reliability to do all a writer or desktop publisher needs. The HP repackaging will offer tighter compatibility with existing Vectra and HP 3000 systems than other laptops. Lower cost alternatives will do subsets of the publishing cycle just as well. The final question is: Should anyone needing a portable like the Zenith SupersPort 286 wait for the Hewlett-Packard version?

HP is planning to offer the system by the fourth calendar quarter of 1988. If everything goes as planned, you might be able to get one by Christmas. Prices are not set, but HP is planning to maintain price parity with Zenith. For those who have longed to purchase a decent, up-to-date HP portable, this may be the opportunity you have been waiting for. *—Ashley Grayson is founder of ADG, a marketing services organization based in San Pedro, CA. Carolyn Meskell is a project manager for ADG.*

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OPINION

Stina Hans
and Mike Harnish

CIM Starts With MRP II

HP has long played an active role in the manufacturing environment. A tour of almost any factory will reveal HP equipment utilized somewhere in the organization for scientific applications, engineering, CAD systems, real-time process control or front-office business applications.

HP's widespread involvement in manufacturing gives it high visibility in many CIM projects. Yet for American manufacturing, CIM is an elusive goal. There are plenty of CIM skeptics. Each one can tell you of a company that spent a fortune on automation without realizing any gains in productivity or quality.

We have no doubt that the skeptics will be eating their words over the next few years as it becomes increasingly apparent that computer-integrated manufacturing is not only practical, but is a necessity for U.S. firms unwilling to relinquish market share to foreign competitors.

Yet at present, it's often the skeptics who control the corporate purse-strings. It's no secret that the cost of CIM is often difficult to justify using current cost accounting methods. Accountants (and boards of directors) only now are accepting that they need new ways of gauging the costs and benefits of CIM.

So, how should far-sighted managers go about realizing their vision of a fully-automated factory, in the face of doubts from some colleagues and reluctance from others to commit to the investment required by CIM? The answer is not to settle for incompatible "islands of automation," duplicating databases, even if each can be cost-justified. That solution will deny you the full power of integration.

A better strategy is to start with a strong fundamental business information system and build an integrated system from there. For most manufacturers, that means starting with a good Manufacturing Resources Planning (MRP II) system; for the true job shop, perhaps a simpler combination of manufacturing data processing software packages. MRP II is a mature technology, proven in thousands of manufacturing environments, with predictable cost/benefits and a fairly rapid return on investment. Your accountants will approve.

MRP II is a mature technology, proven in thousands of manufacturing environments, with predictable cost/benefits and a fairly rapid return on investment.

Apart from making sound financial sense, MRP II is a logical foundation on which to base a CIM system. Before you can produce a long-term automation strategy, you need accurate information about how your company is operating now. What are the true costs of production? Just how much inventory do you have? Exactly where do the bottlenecks in production lie? Can your customer service personnel give reliable information to customers about the status of their order? If your existing software cannot give you this data, you'll be building your CIM system on a foundation of sand.

Your first steps, then, should be to integrate the accounting, order entry, inventory management, costing and shop floor control functions in your company. That will give you a centralized database of accurate, easily accessed information — the ammunition you need to achieve:

- *boosts in productivity*
- *control over costs*
- *more accurate inventory, and consequently greater control over inventory, permitting stock reductions*
- *ability to create realistic production plans that can be met*
- *better control on the shop floor with the ability to identify bottlenecks and non-productive labor*
- *more responsive customer service, because it will be easier to track orders*

In short, you will get a much better grip on your company's operation. You'll have a better picture of what is working well and where the problem areas lie.

At this point, you can re-evaluate your company's procedures, see what can be simplified or improved, and adjust your vision of automation accordingly.

Only when you have a good fundamental business system in place, providing you with the management infor-

mation and manufacturing control that you need, should you move to the next stage of integrated automation, with links to CAD/CAM, automatic data collection devices, real-time production control systems, and so on.

Two Crowe Chizek (Indiannapolis, IN) clients bear witness to the value of this strategy. Transmatic Corporation (Holland, MI), a leading metal-stamping operation, has long realized that CIM is a viable goal for both its repetitive manufacturing and job shop operations. Transmatic began by implementing an MRP II system with custom-developed accounting modules on an HP 3000 before moving to integrate its business software and CAD systems to programmable manufacturing equipment.

Four Winns, a Cadillac, MI, boat manufacturer, also began with an MRP II system with other business application software. The company then installed HP 3081 bar code readers for collecting time and attendance data and labor transactions at its four sites. The company saves many man-days a week by eliminating the need to process clock cards.

In both cases, by having better control over basic operational information, the companies were able to implement more advanced manufacturing systems with little difficulty and in a logical fashion.

We are not, therefore, suggesting that you should rush into MRP II without even considering how you will later integrate additional computer-controlled systems. Clearly, the better your CIM planning, the more likely you are to have a smooth implementation. But, installing an open-architecture MRP II system now certainly is better than waiting for your complete CIM proposal to be approved.

Who knows, by the time your manufacturing control system is in place, maybe even the skeptics will be converts to the necessity for CIM! — *Stina Hans is president of MCBA Inc., Glendale, CA; Mike Harnish is a senior partner with Crowe Chizek & Company, Indiannapolis, IN.*

Continued from page 12.

ing 15 percent of U.S. customer spending, are at stage 3.

According to Lew Platt, "As you can see, the most action is going on in second stage companies today (HP is a stage 2 company), and there is a tremendous pool of companies that are thinking about moving from stage 1 to stage 2. Very few companies are doing stage 3 thinking."

HP's motto for a successful CIM implementation: Plan big; start small; build incrementally.

HP preaches the gospel of manufacturing convergence (see *Figure 3*). By convergence, HP means to work toward common systems, materials and processes. HP believes that the theory of convergence was directly responsible for its manufacturing success, such as the success that has been experienced at the Cupertino manufacturing division (see *Figure 4*).

According to Platt, HP was lead to CIM not because it wanted to build things faster, but because it wanted to build them better.

Tools For Implementing CIM

Speakers at the CIMinar focused on three major tools used for successful CIM implementation. These included total quality commitment (TQC), just in time (JIT) manufacturing methods and continuous process improvement (CPI).

George Henry suggested that CIM implementers need to change their ways of thinking from a focus on products to processes, batch to continuous flows, yield to failure rates, long to short manufacturing cycles, and stagnation to breakthrough thinking.

ROI And HP's Justification For CIM

"With a total quality commitment (TQC) and CIM, you can realize big benefits in areas that are initially hard to quantify. For instance, how do you put a ROI value on the fact that your manufacturing operation is more predictable and you are better able to meet the customer delivery dates?

"How do you quantify the benefits of shorter lead times, which are greater flexibility and responsiveness?" said Platt.

"Have you ever thought about the benefits of dramatic savings in factory floor space? Few people factor them into ROI thinking when contemplating a CIM program.

"The point is that, at HP, we have successfully used larger measures to justify capital expenditures. We view overall trends rather than scrutinizing each project. To be truthful, we have undertaken CIM projects in which the predicted savings wouldn't ordinarily justify the expenditure. And they paid off." ■

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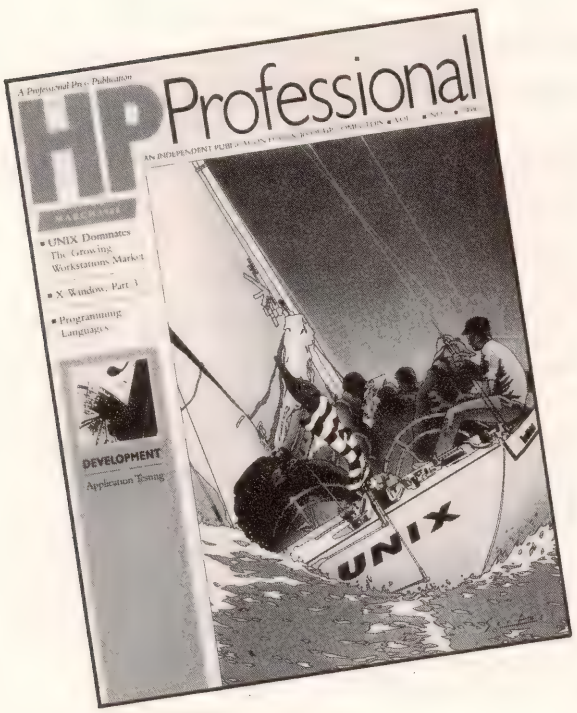

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Continued from page 24.

MiniSoft Ships Graphiti For HP 3000

MiniSoft has begun shipment of Graphiti, a complete business graphics system for the HP 3000. Graphiti allows users to create a variety of business graphs through easy-to-use menus, making it suitable for the general office environment.

Graphiti features line charts, bar charts, stacked bar charts, scattergrams, pie charts, horizontal bar charts, titles for graph heading and x and y axis titles. It also features line name, legend, pen/color selection, fill pattern, line pattern and tick marker specification.

A special interface to MiniWord, MiniSoft's proprietary word processing package, allows for the integration of graphs and documents. Graphiti features output to all HP plotters, printers and laser printers either local or spooled, on paper or transparencies. Graphiti can be operated from any terminal or personal computer emulating a terminal. A graphics terminal is not required to view a graph generated by Graphiti.

Contact MiniSoft Inc., 16315 NE 87th, Suite B101, Redmond, WA 98052; (800) 682-2000; (206) 883-1353.

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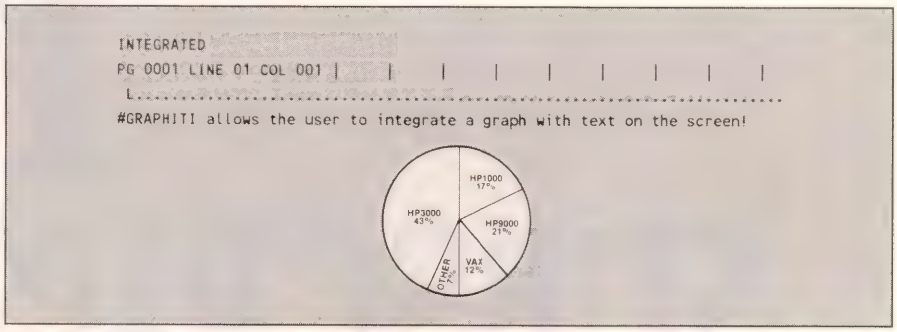
MCBA Releases Master Scheduling

MCBA Inc. recently announced its Master Scheduling package for HP 3000 computers. The package is part of MCBA's 18-package Manufacturing Resource Planning (MRP II) system.

Master Scheduling (M/S) is primarily designed for repetitive manufacturers, allowing them to produce detailed master production schedules based on market forecasts and actual orders. The master schedule can include finished goods, common subassemblies, raw materials or a combination of these. The package also can be used to identify under- or over-scheduled work centers through rough cut capacity planning.

In addition, Master Scheduling ($6,000 — $9,000) allows interactive entry of requirement and replenishment orders on the master schedule, including creation of firm planned orders; merges existing shop orders, purchase orders and Material Requirements Planning (MRP) planned orders into the master schedule for easy comparison with customers orders and sales forecast orders; displays or prints how much of each inventory item is, or will be, available for delivery in current and future periods, and more.



Graphiti allows the user to integrate text with graphics.

Contact MCBA, 425 W. Broadway, Glendale, CA 91204-1269; (818) 242-9600.

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SAS Institute Releases C Language Learning Tool

SAS Institute Inc., which is currently rewriting its entire software line in the C programming language, will begin shipping a new instructional package designed to help others learn C.

The SAS/C Compiler, Student Edition, features a full-function C compiler for the PC with a comprehensive C language tutorial. The tutorial presents the C language through learning modules, progressing from basic concepts to advanced programming techniques. Each chapter provides examples and sample programs that can be compiled and run with the student compiler.

Compiler and sample programs are distributed on two 360K double-sided double-density 5¼-inch discs. The compiler requires 512K of main memory. It runs under PC-DOS or MS-DOS 2.1 or later.

Contact SAS Institute's Book Sales Department, (919) 467-800. SAS Headquarters are at SAS Circle, Box 8000, Cary, NC 27512-8000.

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OCS Announces Job Queue Management

Operations Control Systems (OCS) has announced a comprehensive job queue management facility for its OCS/EXPRESS batch job scheduling system.

The new facility allows a shop to define a set of rules that equitably distribute batch processing resources and ensure that individual user-launched jobs do not dominate the batch execution queue.

Operations now can restrict the maximum numbers of user-launched jobs that can process simultaneously. Job queue definitions can be based on time windows or set at the account, group, user or job name level. This facility also can be used to reduce contention for specific system resources such as databases, files or tapes.

Job queue management is fully integrated with OCS/EXPRESS and is available at no charge to all OCS/EXPRESS customers under a current maintenance agreement.

Contact Operations Control Systems, 560 San Antonio Rd., Palo Alto, CA 94306; (415) 493-4122.

Circle 383 on reader card

HP Releases Productivity Primer

Hewlett-Packard has released a productivity primer (Publication 5954-6629) that describes HP's use of design-automation tools and how it evaluates the effect of those tools on overall productivity.

The 16-page primer explains that quality design tools are only one part of a complex equation for defining organizational productivity. Other components include identifying, measuring and modifying the product-development processes that affect business goals.

Management support for efforts to address productivity issues is another key element.

Examples from HP's internal installations at Boeblingen, West Germany; Roseville, CA; Fort Collins, CO; and Waltham, MA, are included.

HP employs more than 5,800 design engineers at these and other product-development divisions. Nine out of 10 design engineers have their own workstation; internally, HP has more than 700 installed seats of its HP Electronic Design System, more than 3,000 seats of the HP-ME Series 10 design and drafting system and 2,000 seats of the HP Engineering Graphics System.

Contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.

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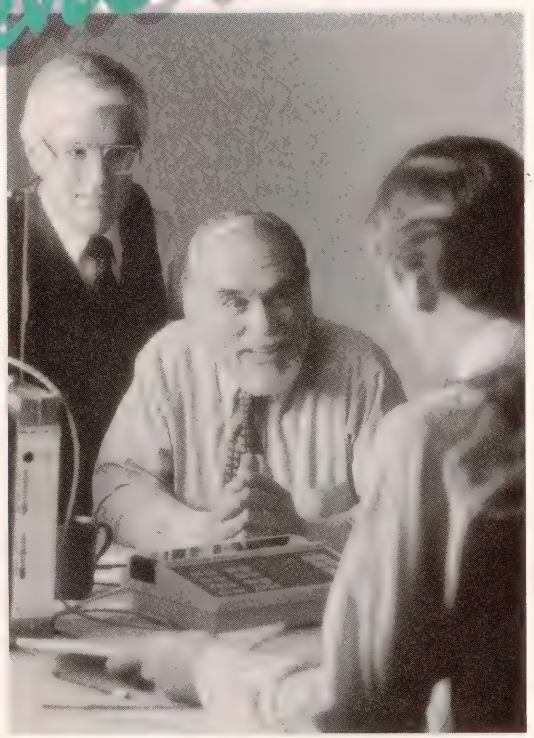

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BCL Now Supports HP LaserJets

Quality Consultants Inc., developer of BCL3000 (Bar Code and Label Management for the HP 3000), has announced support for printing on the HP LaserJet II, HP Laser 2000, HP LaserJet Plus and the HP-IB interface for HP 256x printers with the HP label card.

BCL3000 allows non-technical users to custom design and print labels and documents without any knowledge of printer programming languages. Labels and documents created with BCL3000 can contain variable and/or constant information that can be barcoded or printed in variable font sizes. Many barcodes are available and each can be customized to meet internal or industry specifications as desired.

Since BCL3000 resides on the HP 3000, printing can be controlled by existing applications such as manufacturing or inventory systems. BCL3000's Application Printing Module (APM) reads data directly from the application as it is written and immediately prints the label or document on the printer specified.

Contact Ken Kimbrough at Quality Consultants Inc., 1775 The Exchange, Suite 380, Atlanta, GA 30339-2016; (404) 980-1988.

Circle 385 on reader card

SKOK Systems Ships ARPLAN V4.9

SKOK Systems Inc. has announced the availability of ARPLAN version 4.9. ARPLAN is a member of the ARTECH family of CAD software products including ARVIEW for 3-D design and ARMAC for user programming. The ARTECH software runs on the HP Series 9000 workstations.

The new ARPLAN version 4.9 contains enhancements in the areas of text/dimensioning/hatching, drawing and editing, programmability, information commands and hardware support.

Contact SKOK Systems Inc., 222 Third St., Cambridge, MA 02142; (800) 333-SKOK; (617) 868-6003.

Circle 384 on reader card

New BMDP Provides System For Data Handling

INNOVUS Inc. now offers to users of the BMDP Statistical Software package a new version that provides a system for data and file manipulation.

BMDP-UX is especially suited for statisticians and researchers who need flexible and/or advanced methods of data analysis. The new BMDP-UX Data Manager (DM) program offers numerous functions that enable users to reconfigure and organize data into suitable forms for statistical analysis. In addition to Data Manager, this new version includes extensive improvements in many of the 39 statistical programs.

Data Manager is an interactive data manipulation system compatible with BMDP Statistical Software's data description and analysis procedures. DM provides many new features and a flexibility in data handling not previously available in BMDP-UX.

Other significant enhancements include the ability to issue system commands and access other software while using a BMDP-UX program. Also, a "Newsfile" now is available that provides the most recent information on specific BMDP-UX programs that users can add to or edit.

BMDP-UX is now available on the HP 9000/300/500/800 family of computers under the UNIX operating system.

Contact INNOVUS Inc., 200 James St. South, Suite 204, Hamilton, Ontario, Canada, L8P 3A9; (416) 529-8117.

Circle 382 on reader card

SECURITY/3000 Speaks French

VESOFT's SECURITY/3000 Log-On Access Control Package is now available with the security message catalog file written in French. This message catalog file translation from English to French was done courtesy of one of SECURITY/3000's users, Michel Riou of Hopital Maisonneuve-Rosemont in Montreal, PQ, Canada.

French-speaking users of SECURITY/3000 may find the "native language" message catalog file a feature of particular interest for their HP 3000 environments.

Contact Eugene Volokh, VESOFT, 1135 S. Beverly Dr., Los Angeles, CA 90035; (213) 282-0420.

Circle 381 on reader card

Execucom Software Available on HP 9000

Execucom Systems Corporation and Hewlett-Packard recently announced the availability of Execucom's IFPS/Plus V3.5, a comprehensive modeling and financial planning system, on HP 9000s running HP-UX, HP's implementation of the UNIX operating system.

Interactive Financial Planning System (IFPS)/Plus is a business planning software package that allows financial and business

professionals to address the entire process of corporate and departmental decision making from information gathering to proposal generation. IFPS/Plus features an artificial intelligence language capability, a non-procedural modeling language, relational database management system, spreadsheet, graphics and report writer.

With IFPS/Plus, financial and business professionals can develop complex financial models, including "what if?" scenarios to help companies formulate business strategies.

IFPS/Plus ($35,000 to $50,000) incorporates an applications development language, relational database management with SQL-like query language, an extensive array of analysis functions to support model building, interrogation, and ad hoc and multidimensional problem solving. To provide users with the capability to analyze business trends, IFPS/Plus includes the "Explain Facility" an artificial intelligence, natural language capability for querying and explaining the results from financial models.

Execucom and Hewlett-Packard signed a joint marketing agreement in early 1988. The agreement specifies that HP shall promote and market IFPS/Plus to potential customers and provide the prospects to Execucom. Execucom is responsible for all sales, services and support of the prospects and customers. IFPS/Plus is also available on the HP 3000.

Contact Execucom Systems Corporation, 9442 Capital of Texas Hgwy. N., Arboretum Plaza One, Austin, TX 78759; (512) 346-4980.

Circle 379 on reader card

New Cartridge Ribbon For RuggedWriter 480

Aspen Ribbons Inc. is now manufacturing a new high-density nylon replacement cartridge ribbon for the HP RuggedWriter 480.

The replacement ribbon ($8.00 — $14.50) is 100 percent compatible with the original equipment manufacturer's product. Specifications are ½-inch X 87 feet with 4.8 mil. high-density nylon.

Contact Aspen Ribbons Inc., 555 Aspen Ridge Dr., Lafayette, CO 80026; (303) 666-5750.

Circle 380 on reader card

RIGHT! Announces New COMPRESS/3000 Features

RIGHT! has announced two powerful new features for the data compression utility, COMPRESS/3000. By compressing files and databases 60 to 90 percent, COMPRESS/

3000 dramatically increases the total disc storage capacity of any 3000 system (including the Spectrum series) as well as reduces backup time and tape use.

COMPRESS/3000 now includes a subroutine that enables user developed software, as well as many HP and third-party programs (editors, compilers, file copy and comparison utilities) to process sequential files, unconcerned about whether the file is in compressed form or not. Many programs are able to use this feature with no modifications to existing source code.

Compressed copies of a file or fileset now can be made to a new filename, group or account. This feature provides users with capabilities such as quickly making compact backup copies of files and databases before critical update operations are performed. The copies easily can be restored, retained or purged as needed. Text and data files conveniently can be archived on disc with minimum impact on disc storage capacity.
Contact OPERATIONS CONTROL SYSTEMS, 560 San Antonio Rd., Palo Alto, CA 94306; (415) 493-4122, or RIGHT!, 2210 Wilshire Blvd. #370, Santa Monica, CA 90403; (213) 259-1630.

Circle 378 on reader card

STC Announces SUPERmate Editor

Supermate Technologies Corp. has announced a new release of its full screen (non block mode) editor SUPERmate for HP 3000 computers. SUPERmate is designed specifically for program development. It includes the ability to directly edit standard EDIT/3000 files without the loss of functionality. This feature will benefit installations that share source code files with other sites, or who do not wish to convert their entire source code libraries to SUPERmate's native format.

SUPERmate is now user configurable. The user can specify certain defaults to make the task of defining the source code's environment much easier. The defaults can include the compiler name, tab settings, prep parameters, etc. SUPERmate now has a number of shortcuts that a programmer can use to make editing even faster. All of SUPERmate's features have been linked to control codes. These codes are user definable. If you already have memorized control codes for another editor, you can change the way SUPERmate responds to match your other editor. The function keys are still valid for novices or those who don't want to memorize control codes.

SUPERmate allows you to use all of the terminal's built-in editing keys. In addition, SUPERmate supports the ability to compile/prep/go from within the editor. It also traps compiler syntax errors for later correction. Contact Supermate Technologies Corp., 528 S. Curtis St., Meriden, CT 06460; (203) 235-3888.

Circle 377 on reader card

DBAUDIT V1.8 Is Now Available

DBAUDIT helps system managers keep tabs on HP 3000 database transactions using IMAGE logfiles. You can use it to monitor a specific user, a troublesome dataset, a dial-

You can increase the productivity of your entire workgroup with PostHaste electronic mail.

Quick, pass the message– PostHaste

Explore the mail system that won't dominate your HP 3000.

PostHaste is designed for speed and efficiency. Its standard Image database is subject to a minimum number of I/O s to post a message. This adds up to speed. PostHaste keeps overhead low so your other applications run faster, too.

PCs and terminals take advantage of all the features you expect and some you probably wished for: security, distribution lists, message archiving, automatic mail notification, local storage and printing.

PostHaste is the only electronic mail package written with personal computers in mind. Use Reflection® to connect your PC to the HP 3000 and you'll be free to write and store mail on your PC. You'll be able to run the mail session in the background while working with your favorite PC or Macintosh applications.

Find out about the new package that makes electronic mail practical for you. PostHaste.

POSTHASTE

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in terminal port or a suspect application program, and see just what changes are being made to your databases. Because transaction dumps can be sorted by up to five keys, including dataset field values, you can use them as audit reports instead of writing custom programs. DBAUDIT provides informative, readable summary reports of database activity, organized by program, user, dataset and logon device. Using these reports, you can pinpoint performance bottlenecks in your database applications.

DBAUDIT version 1.8 has many additional features, including full compatibility with MPE/XL and the logfiles generated by TurboIMAGE/XL. Checkpoint/Restart on the Input command simplifies daily audit. You won't have to change parameters for the standard DBAUDIT reports you run every night; DBAUDIT records the name of the last logfile processed and starts the next audit where it left off. You can exclude selected datasets from the report and sort all the transactions for a given process together. The new Show command lists database sets, items and fields. There are options to drop "no data changed" updates from the report or to select only null updates. Two JCWs record the number of inconsistences in your logfile and the number of incomplete logical transactions. You can use these JCWs in a batch job to decide whether a database recovery is possible and necessary.

These and other new features are fully explained in the new User Manual, which is included on the update so that users may print as many copies as they like, on a lineprinter or LaserJet. This version of DBAUDIT has an updated help file. All users of DBAUDIT covered by service will receive an update tape automatically.

Contact Robelle Consulting Ltd., 8648 Armstrong Rd., R.R. #6, Langley, B.C. Canada V3A 4P9; (604) 888-3666.

Circle 375 on reader card

Unison's DiscMaster Saves Disc Space

Unison Software has announced DiscMaster, the first disc space management system available for the HP 3000/900 Series Spectrum computers. DiscMaster saves disc space and increases productivity by carrying out a user-defined disc space management policy.

DiscMaster automatically saves disc space by identifying files that have not been accessed within a certain amount of time; recommending disc space recovery activities, such as purging specific files, archiving old files to tape, or compressing and trimming files infrequently accessed; estimating the disc space that can be saved; and executing requested space-saving activities automatically.

DiscMaster's Survey Reports show which files meet disc space recovery criteria, the recommended recovery actions and the amount of disc space expected to be recovered. The user may exclude files from certain actions, request other actions or include other files.

When the recovery process is completed, DiscMaster produces a Regain Report to show what actions were taken, which files were affected and how much disc space actually was recovered. These reports reveal how much space is being used, who is using the space and how often the space is being accessed.

The information obtained from DiscMaster allows for more accurate evaluation of hardware acquisition needs. DiscMaster is priced according to CPU size.

Contact Unison Software, 415 Clyde Ave., Mountain View, CA 94043; (415) 968-7511.

Circle 374 on reader card

Digi-Fonts Announces Typeface Library

Digi-Fonts Inc. announced the release of the largest library of high-quality fonts currently available for the HP LaserJet family and compatible printers. The Digi-Fonts Typeface Library includes 272 scalable typefaces in a wide range of popular styles, plus the FontMaker converter program.

FontMaker uses Digi-Fonts' outline typefaces to create bitmap fonts conforming to the SoftFont format. Users can select type sizes and widths from three to 720 points, slanting from -45 to +45 degrees, full 360 degree rotation, plus flop and reverse options. FontMaker will create any font in portrait or landscape orientation, with complete or partial character sets.

The Basic Set ($69.95) includes eight scalable typefaces and the FontMaker converter program. The Complete Library ($349.95) includes an additional 264 typefaces.

Contact Digi-Fonts Inc., 3000 Youngfield St., Ste. 285, Lakewood, CO 80215; (303) 233-8113 or (800) 242-5665.

Circle 373 on reader card ■

Remember how computers remembered? Mercury delay lines? Punched cards with 90 columns and round holes? Hand-wired magnetic cores? In case your memory needs refreshing, The Computer Museum would like to share its memories with you.

The Computer Museum Memory Poster
We have created a limited edition, 20"x32" poster of the picture shown below. Printed in full-color, it includes an identification key to help you recall the memories you've forgotten. To get your poster, along with an information kit on museum membership, exhibits and activities, send a tax-deductible contribution of $25 or more to:
Memory Poster, The Computer Museum,
300 Congress Street, Museum Wharf,
Boston, MA 02210.
Please allow six weeks for delivery.

CIRCLE 148 ON READER CARD

COMPUTER MEMORIES FOR SALE

YES! Please refresh my computer memories. A tax-deductible donation of $25 or more made payable to The Computer Museum is enclosed.

Name_____

Address_____

City_____ State____ Zip_____

The Computer Museum
Located on Museum Wharf
300 Congress Street, Boston, MA 02210
(617) 426-2800

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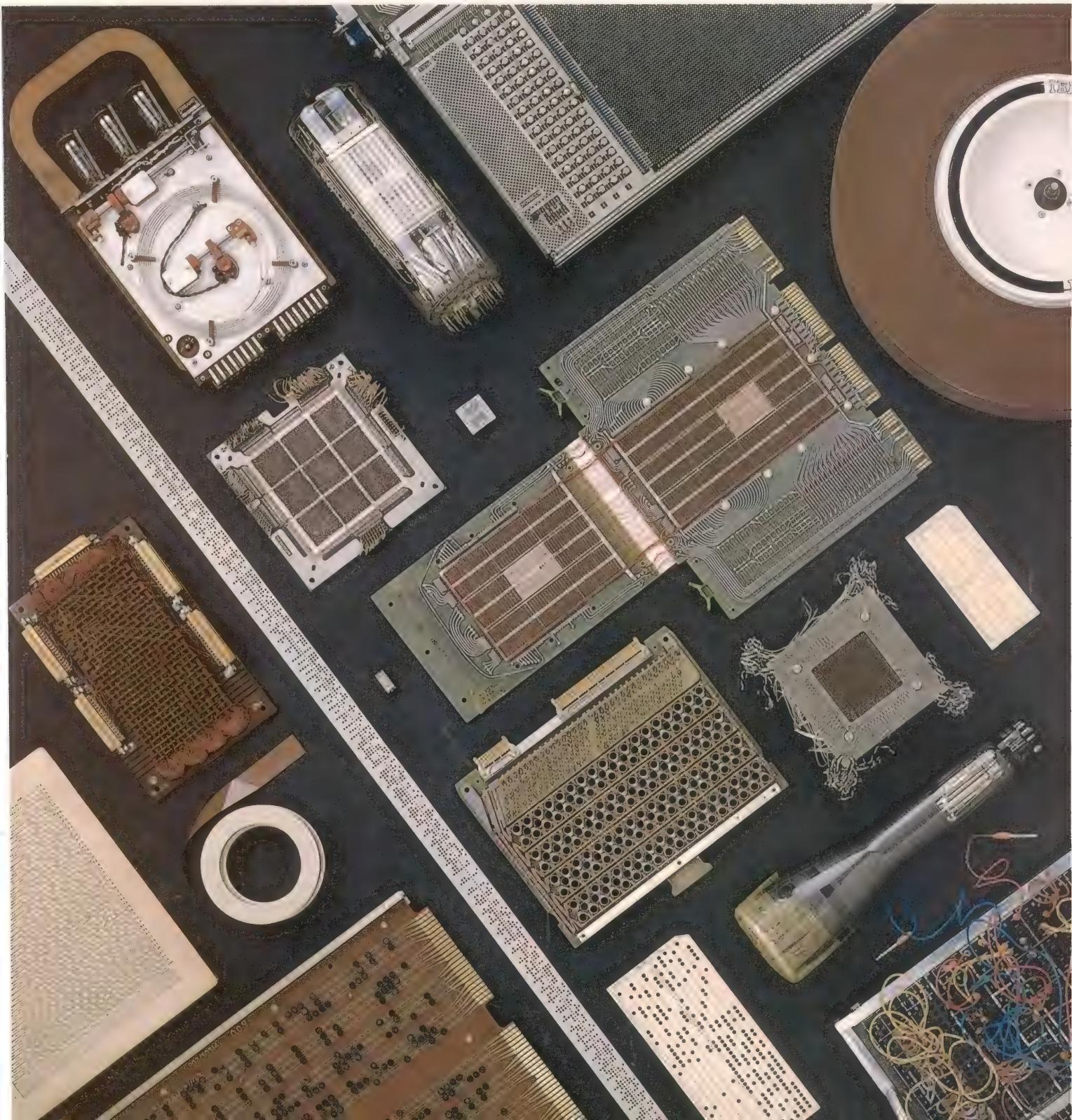
Special thanks to this publication, Scitex America Corp. (color separations), Grafik Communications, Ltd. (design), David Sharpe Studio (photography) and VM Software, Inc. (poster).



Meet the technology leaders in Computer Graphics

—at the Invitational Computer Conference near where you live and work.

The Computer Graphics market is growing so fast it's hard to keep up with the products and trends you need to know about for informed quantity purchase decisions. So we make it easy for you—at the Invitational Computer Conference (ICC), the one-day, seminar/product displays that bring the latest information on computer graphics hardware and software technology and products to your area. This year there are eight ICCs dedicated exclusively to the computer graphics systems integrators, OEMs and volume end users in the United States and Europe. One will be convenient for you.

The ICCs are so popular because they give you just what you need to know without wasting your time or money. You don't travel far, there's no admission fee, the seminars and table-top displays from major manufacturers are all targeted to your interests (no searching through aisles), and the atmosphere is informative and hands-on, but congenial, with refreshments served. In a few hours you'll have the latest story on the newest and best in graphics, CAD/CAM/CAE/CIM/CAP, etc.

Invitations to the ICC in your area are available from an exhibitor or the ICC management. Request yours today.

CIRCLE 246 ON READER CARD

1988/89
Computer Graphics Series

U.S. Locations

Chicago, IL	Sept. 21, 1988
Irvine, CA	Oct. 4, 1988
Dallas, TX	Oct. 20, 1988
San Jose, CA	Feb. 6, 1989
Newton, MA	Feb. 15, 1989

European Locations

London, England	May 11, 1989
Frankfurt, W. Germany	May 17, 1989
Paris, France	May 23, 1989

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ADVERTISERS INDEX

[CALENDAR]

[SEPTEMBER]

13: NECRUG Meeting, Holiday Inn Midtown, 1305 Walnut St. Philadelphia, PA. Contact Scott Baldwin, (215) 875-5324. The meeting's focus will be Local Area Networks on the HP 3000. Early registration by Monday, August 29, 1988, costs $33.00 for members and $40.00 for non-members. Late registration after Monday, August 29, 1988, costs $40.00 for members and $45.00 for non-members.

[OCTOBER]

9-12: NCGA CAD/CAM '88, John B. Hynes Veteran Memorial Convention Center, Boston, MA. Conference and Exposition sponsored by the National Computer Graphics Association (NCGA).

9-12: Ada Expo '88, Anaheim Convention Center, Anaheim, CA. For more information, contact Dean Altvater, Program Coordinator, (301) 662-9400.

11: Greater Los Angeles Users Group seminar, "How To Get The Most Out Of PowerHouse," Dave Robinson of Powerspec International, 8:30 a.m. — 5:30 p.m., Beverly Hills Ramada Hotel, 1150 South Beverly Dr., Los Angeles. Registration fee $195. Send check, payable to Vesoft, indicating the names, addresses and telephone numbers of those who will attend, to Vesoft Inc., 1135 S. Beverly Dr., Los Angeles, CA 90035; (213) 282-0420.

20: "PC to HP 3000 Connectivity Tools & Techniques" seminar offered by SCRUG (Southern California Regional Users Group) at Griswold's Hotel in Fullerton, CA. Registration deadline: October 13. Fees: members $195 and non-members $250. For more information, call Karen at the SCRUG office: (213) 453-5664.

26-28: Federal Computer Conference, Washington Convention Center, Washington, DC. Call (301) 961-8990 for exhibitor information.

31-11/3: UNIX Expo, Jacob K. Javits Center, New York, NY. Call (212) 391-9111 for exhibitor information.

[NOVEMBER]

17: "PC — HP 3000 Electronic & Desktop Publishing: Evaluating the Options" seminar offered by SCRUG at Griswold's Hotel in Fullerton, CA. Includes information on the latest software for use with HP products and how to determine which type of system you need, as well as the costs in running the systems. Registration deadline: November 10. Fees: $150 members and $195 non-members. For more information, call the SCRUG office at (213) 453-5664.

There's one error even our software won't flag.

When it comes to computer operations, you'll find NSD's JobRescue™ is perfectly matched to your needs.

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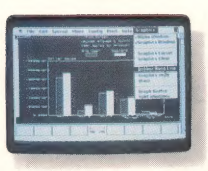
Looking for Trouble HP 3000 Software

You'll never draw a blank with Reflection 3 for the Macintosh.

Is your Macintosh missing HP Graphics?



The new Reflection® 3 for the Macintosh links your Macintosh® with graphics programs running on the HP 3000, 9000 or 1000.

Reflection 3 combines high quality graphics terminal emulation with the familiar look of your other Macintosh software. Use your Macintosh mouse to create graphics on the HP. You can even cut graphics and paste them into another Macintosh program!

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